Who gets the prize:

the case for random distribution

in non-market allocation

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Summary

Distributing 'prizes' randomly —by a lottery—is illustrated using examples from differing contexts. These are: the allocation of a scarce medical treatment, the distribution of tickets at Wimbledon, university entrance in the Netherlands, awarding directory enquiry phone numbers, sacking from jobs in China, sharing common resources in Victorian coal-mines and winning Green Card entry to America. The use of random distribution is explored by reference to standard economic theory such as Rent-Seeking, Elicitation and Prospect Theory, Design of Economic Mechanisms, Information Theory as well more speculative theories related to fairness, justice and inter-personal comparison. *Merit* is the generally accepted basis for the award of jobs and promotions, or of places at a school or university. The valid knowledge which can be applied to the measurement of this merit is examined and is found to be limited. When knowledge runs out, then in the interests of fairness and efficiency the best way to choose the winner is by randomly selecting from the qualified applicant pool, with chances of selection being weighted according to measured valid merit. For other types of non-market distribution random distribution may be convenient, but a market solution is normally better. It is almost always wrong for public assets to be *given* to commercial firms using random distribution; extracting full market price by auction is better. When members of a group wish to share a limited number of non-divisible benefits, then random distribution is not only efficient for all concerned; it can enhance human welfare by strengthening inter-personal feelings as well as a sense of justice and fairness, benefits which may apply to all other forms of random distribution as well. Suggestions are made for further development of the idea of random distribution, which include opportunities for field work, and also advocacy.

Declarations:

1. This work has not been previously been accepted in substance for any degree and is not being concurrently submitted for any degree.
2. This thesis is the result of my own investigations, except where otherwise stated. Other sources are acknowledged by footnotes giving explicit references, and a bibliography is appended.
3. I give consent for my thesis, if accepted, to be available for photo-copying and for inter-library loan, and for the title and summary to be made available to outside organisations.

Signed

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Acknowledgements

I would like to thank my supervisor, Dr James Maw for his unfailing patience, and continual intellectual stimulation while I wrestled with such an unconventional economic idea: Prof John Treble, who introduced me *inter alia* to the delights of the Durham miners and their cavilling, and to the Department of Economics at Swansea, firstly for bravely accepting such an odd research student as myself; and secondly for providing such a stimulating human environment.

My ever-supportive wife Nesta deserves especial mention. Having expected a quiet retirement back in South Wales, perhaps she now hopes never to hear ‘and the answer is of course—use a lottery!’ again. In this I must disappoint: my enthusiasm for random distribution remains undiminished, even after production of this thesis.

0. Introduction: Lotteries: from a ludicrous idea to a plausible one

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0.1 Non-market distribution and randomisation

For most things, most of the time, our standard of living depends on our wealth and how we choose to spend it. The market economy has been supremely effective at providing an abundance of products and services at prices which the consumers can afford. Those things which are distributed by non-market channels may seem of little concern, hardly worth exploring. Not so. Access to education at all levels is constrained by selection processes. Employment opportunities, getting a job, being promoted, becoming redundant are invariably matters of bureaucratic, not market-based procedures. It is education and employment which are the main determinants of earning potential, and hence our position in the economy.

The acceptable non-market means by which these valuable commodities are distributed is usually called 'merit'. The award of a school or university place is the starting point for our meritocratic society. Jobs and promotions should also be a reward for merit. I do not intend to challenge the ideal of a meritocracy, just draw attention to its shortcomings. It is at this point I would like to introduce my particular idea: When differences in relevant merit are small, then all candidates should be treated as equals. The best way to do this is by randomly distributing the limited supply of places or positions—in other words *by a lottery*. Even if significant and

relevant differences in merit are to be found, this should not *automatically* exclude those of lesser merit. All qualified candidates should be given a chance in proportion to their merits. In Chapter 3 I will show how a weighted lottery is being used to implement this ideal.

Apart from education and jobs, the most significant other life-transforming non-market transaction is that of choosing of a mate. Readers may be relieved to learn that I do not suggest that this 'marriage market' be transformed into a lottery[*]. There remain a few essential commodities which are sometimes distributed through non-market channels. Subsidised housing for the less-well-off has to be distributed by social agencies, because the market economy has not been universally successful. As Galbraith puts it: 'The inadequate provision of housing at modest cost in contrast with that of say automobiles or cosmetics, can be considered the greatest single default of modern capitalism' (Galbraith, 1987, p290). Here too, random distribution may provide an alternative to purely bureaucratic selection.

Some products are intentionally kept out of the market—children for adoption or kidneys for transplant—are examples where social norms prohibit sale to the highest bidder. Instead, bureaucratic procedures are used. In such socially determined allocations the justice of using the random arbitration of a lottery has been explored.

As a matter of operational convenience, firms and public agencies may also use non-market mechanisms like queuing to manage short-run excesses of demand. Whether a random distribution mechanism would be an appropriate alternative is a matter of efficiency and perhaps consumer preference.

There are other kinds of non-market transactions: Within producers' co-operatives division of their assets is a matter of choice amongst the members. When government

[*] Although Barbara Goodwin (2005) in *Justice by Lottery* makes just such a proposal as part of TSL – a Total Social Lottery.

transfers public assets into private hands, this is often done by non-market means. This can be on a small-scale like the issue of licences to hunters, or involve large-scale transfer of public assets like the radio spectrum to commercial firms. Lotteries have sometimes been used for these non-market transactions.

The range of transactions which are outside of the market is very diverse. Despite the attractions of markets in providing for the welfare of consumers, most of the non-market forms of distribution are likely to remain outside the market. Their effectiveness and justice should be addressed. Whether these transactions can be enhanced by the use of randomised distribution is the subject of this thesis.

0.2 Review of the uses of random distribution

Using a lottery to decide who gets what has a long pedigree. The classical Athenians chose their representatives and administrators, not by election but by lot (Headlam, 1891). Later, in Renaissance Italy, the Venetian oligarchy divided up the important jobs amongst themselves using the 'ballotta'—drawing a ball at random from an urn. (Finlay, 1980). The practice of using a lottery to select young men to serve in the military dates back to Naploeonic times, but is best known as the 'draft' in the US during the Vietnam era. (Angrist, 1990). For most citizens, their main experience of a random selection is being called upon to serve on a jury. (Abramson, 1994). More frivolously, a lottery decided who may buy tickets for the 2005 charity mega-concert 'Live8'. The Wimbledon tennis championships uses a ballot for the chance to buy the best seats (more on this in Chapter 2).

There are other less well-known contemporary examples of the use of random distribution of prizes. For example; Golf-course playing times at St Andrews; licences to hunt alligators in Florida, Moose in Maine and big-horn sheep in Colorado. Student housing is also subject to random distribution in many US universities (more about this in Chapter 9). A lottery for places at medical school is organised annually

in the Netherlands—an example that is copied in a few other countries, and should be more widely known about—I will explain this in more detail in Chapter 3. Inspired by an earlier paper of mine (Boyle, 1998), Martin Wainwright, northern editor of The Guardian persuaded a committee to use a random process to pick candidates for a board to oversee the distribution of National Lottery funds. Some commercially valuable prizes have been given away by lottery: Landing slots at New York's la Guardia airport; oil drilling leases; telephone numbers; broadcasting bandwidths. (Details of these and other current uses of random distribution together with the sources used can be found on my website at http://www.conallboyle.com/lottery/2-Ex-Current-L.html)

0.3 Previous analysis of random distribution:

My interest in the use of random distribution is directed at its economic aspects. There is already extensive analysis in other fields, but to date little from economists. Examples of writers who have examined the idea of using random distribution include:

Historical evidence: on Athenian democracy and the Venetian oligarchy have already been mentioned. Headlam (1891) is one of the few authors to concentrate on the random selection aspects. Other historical writers mention the lottery in passing such as Norwich (1977) on Venice or Wilms (1974) on the land-lottery in Georgia, US. Many references for historical sources can be found in works by Jon Elster.

Philosophical: Random distribution as an economic mechanism has been the subject of a number of papers from John Broome (1984a, b, 1990, 1994). Much of his research in the past has been in the border territory between economics and philosophy. He has examined the case for the use of random distribution in a number of papers—some examples can be found in the References.

Theological: 'The lottery, as Aquinas's position suggests, was regarded in medieval times as a means of getting God to speak', according to Duxbury (1999, p18). If the outcome of a random process was 'in the lap of the gods', then it would be blasphemous to invoke it for frivolous reasons. Some echoes of this could still be found in modern times, for example in the cavil, described in Chapter 6. Nor did the connection with gambling do much to redeem lottery choice in the opinion of the religious either.

Sociological: Jon Elster in his 1992 *Local justice: how institutions allocate scarce goods and necessary burdens* and in several other books describes many examples of 'social lotteries'. He is frequently quoted on this and other subjects.

Political: There is a growing corpus of work which proposes reforming the democracy through the use of random selection in the place of elections. Burnheim at Sydney, Australia (1985) produced *Is democracy possible? The alternative to electoral politics* where he proposed the ides of 'Demarchy'—all functions of society devolved down to the smallest units which would be ruled by juries. Barbara Goodwin at East Anglia has suggested an extreme version of random selection in her Total Social Lottery (2005). John Sutherland's 2004 *The Party's over* suggests replacing M.P.s with a grand jury of citizens selected at random, or alternatively an *ad hoc* jury to review each piece of legislation. Reform of the House of Lords has similarly produced suggestions that the Lords be replaced by a jury drawn from the electorate—the Demos think-tank published a pamphlet on *The Athenian option* (Barnett, 1998) to this effect.

Legal: Neil Duxbury at Manchester in his 1999 *Random justice - on lotteries and legal decision-making* explores not just juries, but also wider aspects of the law in relation to random selection. After a thorough-going analysis of various aspects of random distribution he concludes (p175) that he had turned 'a ludicrous idea into a dubious one.' Of course I hope to go a bit further, and show that the idea of using random distribution is an eminently plausible one, economically speaking.

Administrative: There are general descriptions of administrative behaviour, notably by Herbert Simon (1976). This was based on first-hand observation of a large bureaucracy in operation. This did not include any procedures involving random distribution or allocation. There are however, a few analyses which assess the validity of random distribution as an administrative tool in a specific application: The Drenth Commission in 1997 investigated the workings of the lottery-based allocation system used in the Netherlands for places at university medical schools (of which a great deal more will be heard, especially in Chapter 3).

Statistical: Understanding and interpreting Randomness is at the core of statistics. It is not surprising therefore that comments about the practicality of applying randomness to the results of Civil Service entrance examinations, or grades of degree at Cambridge came from Francis Ysidro Edgeworth, who was well-known both as an economist and as a statistician. (Edgeworth, 1888 & 1890). I have tried to follow this statistical line with a paper: 'Organizations selecting people: how the process could be made fairer by the appropriate use of lotteries' (Boyle, 1998).

Economics: For such an essentially economic phenomenon as the distribution of goods by lottery there is a surprising dearth of literature. I have found only one paper, that by John Boyce 'Allocation of goods by lottery' (1994) which directly deals with the topic[*]. His primary interest lies in environmental economics, in particular the effect of allocating hunting licences by lottery, but his approach is more general. Boyce used three approaches to test the plausibility of random distribution. The first is 'elicitation', which is a form of opinion polling. A cross-section of the population is asked to comment on different means of rationing scarce resources, including by lottery. The second economic approach is to gauge the extent of wasted effort expended in trying to win a prize. This is the well-known idea of rent-seeking.

[*] Two other economic papers are more narrowly focused: Kerr (1995) compares the fairness and efficiency of either rationing by price or by lottery as a means of distributing publicly owned assets like hunting licences. Taylor et al (2003) compare the customer benefits of queuing with lottery distribution. I will return to both papers in Chapter 2.

Thirdly, Boyce considered General Welfare: to what extent distributing prizes by a lottery evens up the benefits between rich and poor. Boyce's analysis starts from the usual economic assumption of purely self-interested behaviour, especially on the part of the applicants. This leads to useful insights where quasi-consumer goods like licences to hunt wild animals are concerned. When goods with some collective dimension are concerned—education is the main exemplar—then notions of inter-personal comparison, fairness and justice will also be involved. Drawing on more recent work from experimental economics on human behaviour, I hope to develop a fuller understanding (in chapters 6 and 7) of how random distribution can enhance the welfare of individuals in a social setting.

0.4 Examples of random distribution: A case-study approach

When approaching an idea as unfamiliar as random distribution, it is helpful, I believe, to first look at several examples where it is used. From an understanding of what is going on in a number of actual situations it should then be possible to draw out a more general economic case for random distribution. Chapters 1 to 7 give examples of the use of random distribution as follows:

1. Choosing who should get a scarce medical treatment
2. Distributing cut-price tickets for the Wimbledon tennis championships
3. Selecting entrants for medical school in the Netherlands
4. Allocating telephone numbers for deregulated directory enquiries in the UK
5. Deciding who will be made redundant in state-owned enterprises in China
6. Distributing workplaces amongst miners in the Durham coalfield
7. Awarding a Green Card entry to the US

Each example is drawn from a different allocation context. Non-market distribution can arise in diverse ways. Firms may choose to distribute their goods to customers by lottery, such as Wimbledon. Public agencies may select entrants this way as in the Netherlands medical school. Within a group, workers may distribute benefits amongst

themselves randomly as, in effect was the case with the Durham miners. Governments may give away telephone numbers to commercial firms by a lottery.

Working from these examples I hope to strengthen the case for random distribution:

– by giving *credibility* to a generally implausible idea

– by showing that it can be *viable* in real-life situations

– that it can be a *robust* method of distributing goods and benefits

– having survived against competitors, it is *fit-for-its-purpose*

Here I am using the idea of evolution, rather than any specific school of Evolutionary Economics. Vernon Smith (2005) explains 'Emergent arrangements … must have survival properties that take account of opportunity costs and environmental challenges', an idea he ascribes to Adam Smith. There need not be a conscious creator for mechanisms that evolve, but we can learn from them how they emerged and survived. Hodgson (2002) discusses various interpretations of Darwinian and biological analogies in economics.

Another feature of the examples which are produced in each chapter is the opportunity they give to introduce some form of economic analysis. When considering the economic merits of a *form* of distribution, a variety of approaches could be employed. Rather than first discussing all the various methodologies, I will introduce a form of analysis in each chapter, as appropriate. How this all fits together is shown in Figure 1, over.

Figure 1: Structure of the Chapters

Chapter Number	EXAMPLE – the prize	CONTEXT	FORM OFANALYSIS
INTRO-DUCTION		A–agent G–Govt B–Business P-peer, people, customer	-Evolutionary Economics
1 Tragic Choices	Emergency Medical Treatment	**A_G** to **P** **A_B** to **P** **(urgent)**	- Elicitation & Prospect Theory -Public Choice Theory -General Welfare
2 Sporting Chances	Wimbledon tickets, (hunting licences)	**B to P** **(club)**	-Rent-seeking -General Welfare (Public Choice Theory)
3 Glittering Prizes	Medical School entry – Netherlands	**A_G** to **P** **(routine)**	- Measuring educational Merit - Evaluating Expertise
4 Lucky Numbers – Nice Business	118 phone numbers	**A_G to B**	-Design of Economic Mechanisms
5 Fortunes in Organis-ation	Sacking in China *luangang*	**A_B to A (P)** **A_G to A (P)**	-Information Theory -Equal opportunity, law
6 Share Common-Wealth	Workplaces in mines in Durham coalfields *Cavil*	**P**eer **to P**eer	-Reciprocity -Inter-personal comparison
7 Stake in Democracy	Green Card diversity program	**G to P**	-Justice & Fairness
8 Why RD Works			-Subjective Well-Being (Happiness)
9 Future Lot Casting			

Distribution mechanisms should be efficient, and fulfil the aims of the principals who produce the prizes. But the ultimate test of any proposed economic mechanism must be the Mills-Utilitarian idea of 'the greatest good of the greatest number'. Unless a proposed change in the method of distribution leads to the ultimate improvement in the welfare of people, it will be a failure. I take as axiomatic that the economy exists for the benefit of all the individuals within in it, not the other way around. I hope to show that for many of the existing cases of random distribution, it produces a good deal for the people involved; and that there are many more situations where the unlikely mechanism of random distribution could be used to improve people's lot.

By exploring a wide range of examples in varying contexts, and by drawing on many sources of information and research data, I hope to understand a particular form of economic mechanism. I will also draw on many different economic theories to provide some explanation. It is not possible to be expert in all of these diverse fields, and my lack of depth of knowledge may be all too obvious. But the nature of what I am attempting to achieve requires breadth of understanding, so I have perforce had to stray into unfamiliar areas of economic science, perhaps even uncharted ones. It is my intention to honestly present what I have found. Any fundamental blunders which I have made are my own, and I would be grateful to have them pointed out.

Chapter 1. Tragic Random Choices

1.1 An example of an urgent allocation: Medical treatment

The context for this example is a publicly-funded organisation dispensing a benefit, here a hospital doctor deciding which patient to treat. Because this is an emergency ward and resources are limited, the decision becomes a matter of life or death. The doctor as agent of the hospital who employs her must decide which customer-patient will get an emergency treatment. A quick decision is vital. From the earliest days of transplant surgery this dilemma has attracted the attention of social philosophers. Calabresi & Bobbit (1978) in their book *Tragic Choices* examined the implications of different procedures for rationing medical treatments in short supply. One option they suggested is to use a lottery. They discuss how a lottery might affect this tragic choice, but only in theory. Broome (1984b) refers to a single case where a formal lottery was employed to allocate medical treatment, but otherwise this is treated as a hypothetical example.

In the following example, an approach to how the random distribution of scarce medical treatment might function is taken from a paper by Anand (2002). He elicited opinions on the idea by asking:

Example: Tossing a coin to decide who should get a scarce life-preserving medical treatment

'Two adults arrive at casualty with a life-threatening condition that does not affect their ability to make decisions. The doctor explains that there are resources only to treat one patient and then proposes that she will decide which one is to be treated by ***tossing a coin****. If you were one of the patients, would you think that a doctor's choice based on a coin toss was a fair way of choosing which patient to treat?'*

This was one of a set of questions that was put to a random sample of the public, and reported by Anand (2001) in a paper on 'Procedural fairness in economic and social choice' in the *Journal of Economic Psychology*. The setting is the administrative one of an agent organising the urgent allocation of a scarce benefit to a customer-patient – in this case two patients. Annand tries to get his sample of the general public to think about these patients caught in this dilemma: Would they (the members of the public) consider it to be *fair* on the patients involved to use randomization in the form of a coin-toss to decide?

Anand found that the members of his sample did not like choices being made for the patients by the toss of a coin. They mostly thought that a coin-toss would be a 'very unfair' way of deciding who should be chosen to receive the scarce treatment. He then went on to make a much more general claim that 'there is strong lay resistance to random choosing as a fair process'. Anand's explanation for this was that random choosing deprives customers and clients of some control or 'voice' in the process. Earlier experiments which attempted to establish peoples' preferences for fairness under hypothetical lotteries have been carried out by Bukszar & Knetsch (1994) and Frey & Pommerehne (1993), both referred to by Anand. The results again seem to show that the public does not like decisions which are made by a lottery.

Comment: It is understandable that a questionnaire should be short, otherwise respondents will lose the plot. In this case, however, there are many other factors which could be considered before deciding whether a coin-toss is a 'fair' procedure or not. Did the two arrive simultaneously, were their injuries equally severe, are their prospects for recovery the same, has one patient greater social responsibilities, or makes a better contribution to society than the other? One simple alternative procedure which is widely used is to treat patients on a 'first-come-first-served' basis. I will elaborate on other possible procedures for selection in the next section, and ask how this might have changed the respondents' answers. Given the actual question posed by Anand, the result he found is hardly surprising. The sample of respondents were drawn from Oxfordshire, and would almost certainly have had no first-hand experience of random distribution. Nor were they given any of the possible alternatives to random choosing. They were only invited to consider the random process, one which has a very poor image. Say 'coin-toss' or 'lottery' and gambling is the first thing that springs to mind. Editors write newspaper headlines that tell readers of a 'post-code lottery' for health treatment: This only means that facilities are not always available at every location, but the lottery reference makes it sound malevolent. The word 'random' has similar bad resonances, with 'killing at random' or 'random terror' suggesting an especial level of horror. With these negative images already imprinted on peoples' minds, and presented with an unfamiliar option, it is hardly surprising that Anand's panel of respondents immediate response was that it would be very unfair to decide by a coin-toss.

1.2 Urgent Administrative allocation: What's the alternative (to coin-tossing)?

It is all very well to say that choosing by the toss of a coin would be 'very unfair', but *some* decision has to be made. Perhaps when alternative procedures are examined, the case for random distribution might be more acceptable. Administrators, be they in publicly-funded organisations like the NHS, or private profit-oriented hospitals will almost certainly be faced with dilemmas over which patient should get a treatment which is in short supply, and is needed urgently. (Why the treatment is in short supply is another question, which will be looked at later). In other situations of excess

demand, a more deliberative approach may be taken, but not here. If the proposed coin-tossing solution to this dilemma is thought to be unsatisfactory, and other simple administrative procedures like 'first-come-first-served' are ruled out, what alternatives are there? Here I will be taking an informal look at some of the possibilities, asking if they could be implemented, and how might the patients react.

Alternative 1: Use the market: Since this is an economics study, perhaps a market-based solution might seem to be the best solution. The doctor (or more likely a hospital administrator) could explain the dilemma, and then offer the one available treatment for sale to the higher bidder. Both doctor and patients might dislike using the market, but the benefits could be substantial: The hospital would gain extra funds which it could invest in facilities, which would enable more treatment to be provided. This might mean that the next time both patients could be treated.

Such ruthless application of free-market ideas would surely be rejected by the public at large. There are some things, like kidneys for transplantation or babies for adoption that are just not for sale. Whatever some economists like Friedman (1980) might say about the benefits of marketing these commodities, most societies insist that these transactions are decided by other, non-market means. This also applies to places at universities, blood donations, which are given without recompense in most countries, and social housing, available at below-market rents. The hospital would surely not want its reputation sullied by doing something which transgresses social norms by selling treatments to the highest bidder.

Perhaps the hospital would prefer to avoid the market-based approach for another less high-minded reason: Administrative cost and convenience. Even if an auction could be organized in a short space of time, running it could be expensive. Money has to collected with some degree of certainty. Clerical staff to deal with such collection would need to be kept on permanent standby. It may simply be less costly to let the doctor decide, and forgo the extra revenue.

*Alternative 2: The doctor uses her **clinical** expertise:* If the doctor was to take the course of action proposed by Anand, she would rightly be condemned as professionally negligent. We expect those whose judgment we value to use their skills and knowledge for our benefit. It is difficult to believe that in the scenario described above, the doctor would be unable to decide which patient had the better clinical prognosis. White & Stancombe (2003) review the literature assessing just how good are the diagnoses given by doctors, and other professionals. The conclusion is that, broadly speaking, doctors are quite good at it, but not perfect. The impact of 'tacit' knowledge is important, but should not be overstated. The reliability of professionals can be enhanced with 'expert system' techniques (Boyle, 1984), but a genuine if honest error is always possible. In the dramatic choice described by Anand, the pressure of the situation could lead to a mistaken diagnosis—that the 'wrong' patient would be treated. Despite this, most people would gladly put their trust in the professional judgment of these most-respected clinicians, rather than tossing a coin or auctioning to the higher bidder.

*Alternative 3: The doctor uses both **clinical** and **merit** judgment:* Again, rightly the doctor uses medical grounds to discriminate, but in the circumstances, this has to be a rapid assessment. In order to find further grounds she enquires about the character of the two patients. One may be a young parent, the other an older single criminal. With such a clear difference in social (but not medical) merit, is it right to reject the criminal? This is not an idle question: Right from the start of organ transplantation such moralistic contentions were weighed up. In Seattle the so-called 'God committee' was set up to make these difficult choices (reported in Calabresi & Bobbit, p187). The committee eventually found that it was too agonising to make these choices, and passed the task back to the medical practitioners. In the end it was felt that only *medical* factors should be taken into account. Even if no overt rules on social merit were in place, we should not be surprised if the doctor, genuinely uncertain on medical grounds, was to pick the 'nicer' of the two patients. I will be returning to the vexed subject of discrimination later in Chapter 5 which deals with both intentional and unwitting discrimination.

As to the views of the general public, I would imagine that they would be happy to take their chance with a doctor who uses both clinical and merit criteria to chose us as the winner: We all harbour a touching belief in our ability to seem nice in others' eyes.

Alternative 4: The doctor is unable to discriminate on medical grounds, so ***secretly*** *picks one of the patients* ***at random****. She then announces her decision* ***pretending*** *it to be based on medical grounds.* This is not as far-fetched as it may seem. Elster (1989) in his masterly 'Solomonic Choices' gives the example of child custody cases, where the judge is frequently unable (in his own mind) to give a clear-cut decision. Yet decide he must, so he goes ahead, dressing up the verdict with trappings of rationality. This, claims Elster, satisfies both parties, the winner praising the wisdom of the judge, the loser cursing his bias. No doubt a similar process might go on when a medical doctor decides, even if partly randomly and in secret, between her two patients: So long as both patients *believe* that their case is decided clinically by an expert, then both winner and loser may find it acceptable. The doctor herself may even be a bit cognitively dissonant—convincing herself that she is doing the right thing for the right reason, exercising judgement based on intuition rather than validated knowledge. This form of fudging may be acceptable all round, but it is fraught with dangers. If fakery is suspected, patients rapidly lose their trust in their professionals. Unwitting discrimination seems inevitable. True expertise will fail to develop unless its limits are acknowledged.

Alternative 5: The doctor truthfully explains that despite using her clinical expertise to the full she simply cannot decide between the two. She then invites the patients to decide by the toss of a coin. This is not a repeat of Anand's original idea: The doctor first uses her clinical judgment, only then explaining her dilemma. Even so, I doubt if actual patients would find this process any more acceptable than the simpler version described by Anand. As he discovered, 'coin-toss' and 'random' have negative overtones; it is far more comfortable to cling to the security blanket of 'doctor will decide'. There are a number of points to be made for and against using a simple lottery in this situation: Against a lottery is Greely (1977) who suggests that if

recipients can argue about any allocation, they feel more satisfied. Anand was also interested in what is called 'voice'—that one of the reasons a coin-toss was thought to be unfair is that it deprived customers of a say in the decision. In favour of a visible act of coin-tossing Calabresi & Bobbit explain that it draws attention to the fact that resources are limited. Edgeworth (1888) suggested another benefit would be that the public, seeing a random drawing take place, would be alerted to the 'aleatory* nature' of the decision. Bureaucrats might not like having such attention focussed on this shortage of resources and their uncertain knowledge.

Alternative 6: The doctor explains, that in her clinical judgment, although patient A has a better chance of survival than patient B (being of a statistical turn of mind she expresses as 2:1 in favour of A), she doesn't think that B should be automatically excluded. After all, she explains, she is not infallible. So again a random event will decide, only this time it is the roll of a die: If 1, 2, 3 or 4 come up then A will be treated, if 5 or 6 appear, then B will be the winner. If this was seriously proposed to two near-death patients, they might find having to wrestle with such a complex statistical argumentation too hard to bear, and expire from mental exhaustion. Perhaps this shows that the wisest choice may be alternative 4, above: fake a clinical judgment, don't confuse the patients. Broome (1994) wrestles with some of these conflicts, asking whether we should attempt to be fair, or to try to achieve the most good. This problem arose because of the Oregon state system which tried to classify and prioritise medical prospects, and treat accordingly. Although Broome decided that it was both fair and would do the most good to treat the patient with the best prospect, he did not go on to consider their relative merits, and how they might be settled by a randomised decision as suggested here—a strange omission since Broome has written extensively elsewhere about the uses of lottery selection.

Yet it is something like this last alternative that I intend to advocate (although not necessarily in this situation). Of course professionals should use their expertise as far as it goes, but they should also recognize its limits. When expertise runs out, it is

* aleatory – depending on contingencies, from the Latin *aleator* – a dicer, *alea – a die (Chambers English Dictionary, 1990)*

wrong to pretend. Instead, the honest answer to this lack of knowledge is, like our doctor, to toss for it. To be absolutely fair, this random selection should be weighted according to relevant objective criteria.

1.3 Elicitation and Prospect Theory

In markets, customers 'put their money where their mouth is', and reveal their preferences through their spending. In non-market situations it is more difficult to hear the customer's voice. Elicitation, as in the example in the last section, is one attempt to find out directly from potential consumers which choices they prefer. 'Prospect Theory' is the name given to this process by Khaneman and Tversky in their 1979 paper on the risks that individuals perceived in various situations, and which risks they would accept. Their experimental technique was to give subjects a range of hypothetical choices, in the form of a questionnaire. From their answers, they deduced that customers do not always behave in ways that economic theory would predict. Elicitation in these non-market contexts is similar to the psychological approaches taken by market researchers attempting to understand the motivations of shoppers—for example Fox & Lusk (2003) on 'Value elicitation in retail environments'.

Using elicitation, Anand claims that he has demonstrated that the public would reject Random Choosing because it would be 'unfair', or even 'very unfair'. Actually, all he has done is show that in the particular circumstance of the hypothetical question posed, that the public don't like randomness. As I have argued earlier, that this is probably as much to do with the unsavoury reputation of randomness and lotteries, rather than any deeply held and thoughtful belief. Eliciting considered judgements about an unfamiliar idea is unlikely to produce good results. In a later example (Chapter 3 Medical school entry in the Netherlands), a survey on the attitudes of those who have first-hand experience of random choosing produced a much more positive result. As a rule, questionnaires should stick to factual questions of the 'How many...?' and 'How often...?' type. Feelings can be tested, but only indirectly, again through factual questions. I give an example of a questionnaire which exhibits these

characteristics in an appendix (B), which measured the Subjective Well-Being of a group of students.

Perhaps it is these shortcomings of a single-shot questionnaire as a form of elicitation that led to the development of procedures like Citizens' Juries. The non-market choices which occur in the public sector are normally decided by elected representatives. Because it was felt that the politicians were out of touch then the authentic and considered views of a cross-section of the electorate should be canvassed in the form of Citizens' Juries. (Reported in The Times 1.4.96 and in The Guardian 20.1.99). Citizens' juries are groups of 12 to 16 people drawn randomly from the local population who are paid to spend a few days considering a particular local problem. Following presentations by experts on the options available, and led by a professional organiser, the citizens' jury will ponder the alternatives, eventually reaching a conclusion as to what is the best policy. Many of the topics discussed include medical themes: Whether Walsall should pay for a new hospice; to decide what drug treatment works best; whether a small local hospital should close. Similar 'People's Panels' are still in operation, for example in Birmingham (information at http://www.birminghampp.org.uk/).

They are not without their critics: The 'jury' may not be truly representative of the population which would be affected. The way in which they are presented with the issues can distort their conclusions. In any case, the results of their deliberations do not constitute any form of proof of settled preferences, such as those which emerge from the workings of a free market. According to Sutherland (2004, p28) not much has been heard lately of Citizens' Juries, so maybe they no longer represent an effective means of sounding out public policy preferences.

The central issue which elicitation tries to address remains: In particular non-market allocations, are the beneficiaries (in other contexts they would be called customers) satisfied with what they get? Also, are they happy with the *process* of allocation by which they get their benefit? (This was Anand's question). It is not always easy to produce carefully crafted questions to elicit reliable answers to these questions.

1.4 Public Choice Theory and General Welfare

Buchanan (2003), one of its founders, explains that originally Public Choice Theory (PCT) was called 'Non-Market Decision Making'. This original title fits very well the description of the topic which I am investigating. PCT provides many useful insights and explanations which are relevant to random distribution, which I will be drawing on. In one respect, though, I have not found PCT particularly useful: The Theory of Public Choice concerns itself mainly with the choices made *for* the 'public', choices which are made willy-nilly by elected politicians and bureaucrats. It has not, as its title suggests, much to do with Choice *by* the Public, about how the public get to choose their preferred goods and services and whether they are satisfied with the result.

Initially, PCT was concerned with the workings of the political process, and how it might lead to influential groups, such as farmers, capturing a greater slice of the available tax-funded resources. Buchanan draws attention to the prevailing socialistic ideology, which was so pervasive in the middle of the 20th Century. Welfare Economics had identified failures in the market economy. Collective provision was the answer, but, as Buchanan suggests, it was assumed that these politicised corrections (collective provision) would work perfectly. 'Public Choice then came along and provided analyses of the behaviour of persons acting politically, whether voters, politicians or bureaucrats…. Public Choice became a set of theories of government failures.'

Considering the topic I am investigating—the case for random distribution in non-market allocation—PCT in some ways has too broad a remit, and in another way is too narrowly focussed.

— Government decisions result in the provision of many goods. Some of these like defence are consumed collectively, others are services to individuals like health care or education. Generally in looking for reasons to adopt random selection I only consider allocations where an individual benefits. A further complication is that many of the benefits provided are classed as 'merit

goods'—provided cheaply to encourage consumption, because of wider benefits that, for example, having an educated workforce brings.

— Many 'non-market decisions' do not involve government. Commercial firms also make many decisions outside the market. I will give one example of a firm distributing its product using a lottery, but the major non-market decisions which all firms make relate to employment. The bureaucratic processes used in commercial firms closely mirrors that in government, and can validly be analysed using the same PCT tools.

Public Choice starts from the assumption that the players in non-market decision making—the politicians, voters, bureaucrats—will act primarily as self-interested individuals who seek to maximise some 'good'. A criticism, which Buchanan acknowledges is that individuals may be differently motivated when they are choosing 'for the public', rather than for themselves in a private capacity. He accepts that the economic model of behaviour is not the be-all and end-all of scientific explanation, but, as he points out, assuming such self-interested behaviour on the part of the players leads to strong predictions which are almost as reliable as those found in the market.

With this in mind it would be useful to think about the motivations of the players in the scarce-medical-resource allocation drama described earlier in this chapter:

> The Doctor, may be quite junior and may therefore lack confidence and be risk-averse. She will operate under a professional ethos, which tells her to maximise patient benefit. But she will also, probably being a middle-class professional, have a particular set of social values, although her training should enable her to act more dispassionately. She is also an individual in a job with her own career aspirations. She may have a family to support, so is likely to practise 'defensive medicine'— avoid taking decisions which may be criticised, or worse, lead to lawyers becoming involved. Another aspect of her career is that she would wish to be esteemed by her peers and supervisors, a major source of job-satisfaction. If she were allowed to make a decision by a coin-toss, this might lift the burden of having to decide who must die. Whether

the doctor will act like a 'Knight' and uphold public service values, or will behave in a more 'Knavish' self-interested manner depends, according to le Grand (2003) very much on the way the organisation is operated. Unlike the pessimists of Public Choice Theory, given the right environment he insists that agents can be relied upon to act like 'knights'.

The Patients and their nearest and dearest will each be attempting to get the prize for themselves. As it is valuable prize, it may be worth paying handsomely for the 'gift of life'. But since this is socialised medicine it will be free at the point of use, so their resources may be directed into other means of winning the prize. Bribery is one possibility. Strategic behaviour is another: Exaggerating the illness, concealing information which casts them in a less favourable light. A coin-toss decision should limit these forms of behaviour, by making them less profitable. A feeling of injustice at this process, or the shortage of medical equipment could led to time spent lobbying local A.M.s or M.P.s.

The Hospital Administration: is part of an ongoing business. The first question for them should be: Why is there a shortage of resources? This may turn into an excellent opportunity to campaign for more funding and a chance to expand their empires, just as PCT would predict. They should also seek efficient means of running the business, so a coin-toss may be a cheap way of resolving dilemmas. They would also wish to avoid any scandal or legal complications which might do damage to the reputation of the hospital. The coin-toss is a two-edged solution: It might provide some legal protection against mal-practice suits, but its use, as Anand suggests, might lead to accusations of acting unfairly.

One of the core ideas of PCT is that of 'rent-seeking'. Like the patients in the example above, if the benefit they seek is provided for free, then they have an incentive to expend valuable effort in order to win that benefit. Rent-seeking as a significant factor will arise in all the examples which I will be presenting. It was Tullock who initially identified that all rent-seeking is wasteful. The value of the prize is not enhanced by

the 'rent' spent in seeking it. For the losers the expenditure is all loss. Even the winners may end up as net losers if their expenditure is too great.

Another idea associated with PCT is the 'Principal-Agent' problem: If you assume that all the actors in the allocation process are motivated solely by self-interest, how can the Principal (the person or body with a benefit to bestow) ensure that his Agent (the administrator) performs as he is required to, and does not just please himself or use the opportunity to make money at the Principal's expense? Although PCT directs its attention to publicly provided tax-funded organisations, this is problem which applies equally to both public and private sectors. Bureaucracies in both make many significant decisions which affect consumers and employees. Changing what they do, for example by introducing randomised procedures, will have to take account of their motivations if the greatest benefit for the customers is to be obtained.

The aspect of 'welfare economics' which Buchanan rails against was its concern with market failures. But welfare economics also considers how the economy produces and distributes benefits for people. It may also be a matter of welfare not just what prize is gained, but *how* it is gained. In the medical drama above, the 'how' question is not easy to answer. Attempts have been made to find a rational answer— for example using the QALY (quality adjusted life year) system or the Seattle 'God Committee' of responsible professionals, as described by Calabresi & Bobbit (1978).

Elicitation provides one method which seeks to understand how individuals value the benefits obtained through non-market allocations. It may also be possible to uncover an equivalent market value by studying consumers' behaviour (an idea developed by Tiebout). An example of this is the considerable effect a good local state school has on house prices (Cheshire & Sheppard, 2004). Both elicitation and the implied market benefit of free goods will feature in many of the examples used later.

1.5 Conclusion: Is Random Distribution the right answer to the scarce treatment dilemma?

The techniques associated with Public Choice Theory, such as the analysis of rent-seeking will provide useful insight in all the examples later on, as will Economic Welfare in non-market allocations. In the hypothetical case described by Anand, random selection is probably *not* a good idea. To toss a coin to select a patient for an emergency treatment leads to one of two results—life or death. Naturally the patients will be risk-averse, so being forced to confront such an extreme outcome would be agonising. Calabresi & Bobbit (1978) concluded that in these circumstances that a lottery is not the best procedure in these extreme situations. In other cases where the prize may still be an important one, but the alternative not too grim, a random allocation may be more acceptable. If you fail to win a place at medical school, for example, you will still be eligible for other courses. If you miss out on a job or promotion, other reasonable possibilities remain. For the life or death example in this chapter the option recommended by Elster seems the most practical: Make the decision on clinical grounds. If that is impossible, pretend it is an objective choice, while discretely using a surreptitious randomisation device (glancing at a watch with a second hand works well).

Chapter 2. Sporting Chances

When businesses (mostly sporting) routinely give away prizes cheaply:

'Someone said 'Football is more important than life and death to you' and I said 'Listen, it's more important than that'.'[*]

2.1 Example of a random distribution: Wimbledon tickets

In this example, a commercial sports organisation chooses to distribute its wares to the public by means of a lottery. Sport and the use of random devices are firmly linked in the public's mind: It is usual to start a football match with the toss of a coin to decide who plays in which direction. In knock-out competitions, it is usual to draw names from a bag to decide who plays whom in the next round. I have come across a number of examples where tickets to sporting events are rationed out, not by price, but by a lottery. The annual Wimbledon tennis Championships distributes a large proportion of the tickets by 'ballot' (lottery). Wimbledon prides itself on opening up access to the general public, although not eschewing insider-outsider discrimination entirely.

Details of the Wimbledon tennis championships ballot follow in the boxed section:

[*] said by Bill Shankly, Manager, Liverpool F.C. during an interview on a Granada Television chat-show hosted by Shelley Rohde in 1981, which produced arguably Shankly's most famous (and most often misquoted) quote.

Example: How the Wimbledon Championships ticket ballot is organised:

From **www.wimbledon.org** 'The official website of the All-England Lawn Tennis and Croquet Club' (AELTC) accessed on 20th Oct 2004

'Demand for Wimbledon tickets has for decades exceeded supply. As long ago as 1924 the Club introduced a public ballot whereby a number of Centre, No.1 and No.2 Court tickets are sold in advance. Many tickets are also sold through The Lawn Tennis Association to their affiliated tennis clubs, schools, membership scheme and to foreign tennis associations. Wimbledon remains one of the very few major UK sporting events for which one can still buy (a small number of) premium tickets on the day. [..] Ground tickets may also be purchased on the day of play on every day of The Championships, although visitors may have to queue for tickets. The AELTC Public Ballot has always been substantially oversubscribed, with the main proportion of Centre and No.1 Court tickets being available in this way

Re-Sale of Tickets Tickets with the word 'Debenture' printed on them in place of the price can be legally transferred or sold on. **All other tickets are strictly non-transferable and must not be sold nor advertised for sale whether on the Internet, in newspapers or elsewhere.** *(AELTC emphasis)*

The Public Ballot: Applying for the Ballot does not automatically entitle applicants to tickets for Wimbledon, but a place in the draw for tickets. Tickets are allocated at random to successful applicants by computer. Furthermore, it is not possible to request tickets for specific days or courts, as the day and court offered are also chosen randomly by a computerised selection process.

The 2005 Public Ballot: To obtain an application form, please send a self-addressed envelope to the address below from 1 August 2004 but **before** 15 December 2004. Requests for forms postmarked after 15 December will not be processed. [...] Completed forms must be returned to The Ticket Office before 31 December 2004. Applications postmarked after this date will not be included in the ballot. *(Comment: no up-front payment is required at this*

Successful Applications and Paying for Tickets: The draw will be made in January 2005 and successful applicants will be informed from February 2005. If you have not heard from us by March 2005, please assume that your application was not successful in the main ballot. However, as declined and returned tickets are re-balloted up to the day of play, we may be able to offer you tickets at a later stage.'

2.2 Commentary on the Wimbledon Championships ticket ballot:

(information used here is taken from the official website of the All-England Lawn Tennis and Croquet Club – AELTC at www.wimbledon.org accessed on 1 May 2005. Other sources as indicated)

The 'ballot', as the AELTC describe the random distribution of tickets to some applicants, has been in use since 1924. Not all tickets are allocated in this way—there are debenture-holders, corporate tickets, and a proportion reserved for players, tennis clubs and the media. It is also possible to queue up and buy some tickets on the day. That still reserves a sizeable proportion of tickets which are only available by ballot to the general public. The website is not specific about this number, but it seems that about 30% of all tickets, especially the most desirable ones, are distributed by ballot. Total gate attendance at the Championships in 2004 was around 450,000, so about 135,000 tickets were awarded randomly. Applications for tickets through the ballot is described as 'heavily over-subscribed', by about six times (according to the Wimbledon Press Office spokesman, Johnny Perkins, in a conversation on 4.5.05). This means that there are about half a million people who choose to take part in the Wimbledon ticket ballot.

If a process of random distribution has been in operation for more than 80 years, and annually involves so many people, then the management of the AELTC must consider that it works well, and fulfils their objectives. During this time they have had ample opportunity to consider alternatives. If their customers had found this an unsatisfactory procedure, they too have had plenty of time to communicate their complaint. Distributing the opportunity to buy tickets for Wimbledon by ballot has stood the test of time.

During these 80 years, the AELTC has had to adapt to major changes. In the early days, it was a straightforward sporting club, dealing with relatively modest numbers of spectators. In the post-war era, numbers of spectators increased, and the game became more commercial, with professional players competing for large prizes. The AELTC resisted the professionalisation of tennis, but eventually in 1968 gave in to commercial pressures. Major money prizes are now on offer to attract the top players worldwide. In 2004 the prize fund stood at £9.7 mn, which would require an average

of about £20 from each paying customer. In 1920 the AELTC devolved responsibility for the commercial organisation of the grounds to a Limited Company (later a plc). Although many of the trappings of a traditional English club still cling to Wimbledon, it is clearly a fully-fledged commercial organisation, intent on making money to cover its running costs, pay out prizes, and to produce net funds which are paid over to the Lawn Tennis Association, to promote the game. In 2003 these funds amounted to £25.9 mn. If more funds could be generated, then the LTA could achieve more.

It thus seems odd that an essentially commercial organisation deliberately chooses to forego additional revenue by selling its product via a ballot at below market price. If a ballot is to work, then the price charged has to be less than the open market price, otherwise there would be no excess of applicants. What explanations can be given for this seemingly irrational non-profit seeking behaviour by the management of the AELTC?

'We have often been asked the question: 'Why a ballot, why not just put up the seat prices' according to Johnny Perkins, the Wimbledon Press Officer with whom I spoke. 'We want to keep Wimbledon accessible to the ordinary fans. Putting up prices would not be popular. Although we could sell each ticket many times over, raising prices would be bad for our image, and not good P.R. The ballot is still regarded as the fairest way to distribute tickets. It ensures that there is access for genuine tennis and Wimbledon fans'

This is the publicly stated view of the AELTC, but behind the avowed public image, there may be a more significant rationale, which I will try to explore. Some of the reasons why the management might chose to avoid higher seat-prices, and deal with the excess demand through a ballot might include:

The fans are not price-sensitive: It would be wrong to charge them exorbitant market prices. The suggestion that sports' fans will pay any price to see their heroes seems to be borne out by the huge prices charged at Premiership football venues. But an example of price resistance by sporting fans was to be found in rugby-mad Wales: On 6th November 2004, the Millennium Stadium Cardiff played to many empty seats for a major game: Wales v. South Africa, because the ticket prices had been raised to

such a high level. So even sports fans are price-sensitive 'rational economic men' after all.

The amount of revenue lost by the ballot is trivial, so best to leave a settled arrangement in place: The amount of revenue lost by using ballot not trivial. As a rough calculation, I reckon that there is a loss of at least £1.5 mn. (This is based on some heroic assumptions, such as: tickets could be sold on the market for at least 30% more than current prices. I have ignored the additional costs of running the ballot). Compared to the surplus funds of £24.9 mn already generated, £1.5 mn is a significant addition. The management of AELTC would seem to be either apathetic or ignorant to deprive tennis development of this large additional source of revenue.

The ballot is a clever way of promoting the product: There may be some merit in the ballot-as-marketing-tool idea, but it seems tenuous. For instance it could be said that:

— the ballot creates advance interest in the Championships. This is unlikely, since there is already massive publicity from TV and newspapers.

— the ballot enables the management to spread attendances away from the popular Finals days. It is true that theatres and circuses hand out free tickets for performances early in the week, to generate interest, but Wimbledon hardly needs such tactics.

— the ballot ensures that the stands are filled with a range of people of varying ages and socio-economic status. This means that the TV audience, which generates the bulk of the revenues, can better relate to a crowd which is not mostly rich and old.

The Wimbledon ballot creates a minor barrier for applicants, and the tickets awarded are meant to be non-transferable: this ought to screen out those non-fans who simply enter the ballot to make a quick profit. Judging from the amount of space devoted by the Wimbledon website to 'anti-tout' warnings, leakage of tickets onto the black market is a major problem. For the management of Wimbledon, the continued use of random distribution for a large proportion of the tickets seems to be acceptable if somewhat quixotic.

But what might explain the acquiescence of their customers, who enter the ballot and buy the tickets? What do they get from this arrangement?

Something for nothing: The entry costs are minimal—just the price of two postage stamps, and the payoff is substantial—tickets to a major sporting event at below market price. The only snag is that you are not supposed to sell your prize on; it is for your use only, although it might not be too difficult to get around that particular hurdle. This reduces the value of the prize to non-tennis fans as the AELTC intends, but it still looks like a very good gamble.

It's trivial—it's only sport after all, and anyway it's fun to enter a lottery: This suggests a strange compartmentalisation in the minds of consumers: Purchasing the weekly groceries is serious stuff, involving weighing up of alternatives, maximising pay-offs. Sport, on the other hand, is frivolous, so irrationality can be tolerated. Nevertheless, such 'framing' effects have been found (Kahneman, 2003) .

2.3 Theory of Rent-seeking and Sporting Chances

I return to Public Choice Theory and the insight it gives on 'rent seeking'. In Boyce's 1994 paper on 'Allocation of goods by lottery' he considers the rent-seeking aspects of distributing hunting licences by lottery in the US. Permits to hunt deer, moose, bear, buffalo, alligators and many other animals in the wild are distributed via a lottery. Although the agencies handing out the licences are usually public bodies, this is essentially a commercial activity. Hunting and killing wild animals is for sporting reasons, not as a livelihood, and the applicants are receiving a permit to exploit public lands. Despite any fee charged there is still excess demand, which leads to the need for a lottery or some other demand-curbing mechanism.

Boyce's approach is to assume that applicants for a benefit which is in limited supply have preferences that are 'consistent with purely self-interested behavior'—in other words are assumed to act like textbook consumers, having a rational fixed set of preferences, unaffected by what others may receive. One obvious choice is to 'rent-seek'—look for bargains, to get something below market price. Entering the

Wimbledon ticket ballot is a good example of rent-seeking; entrants hope to gain a prize at below market price. Boyce examines lotteries where recipients may or may not trade after allocation. Post-allocation trading increases the value of the prize, which in turn may attract more entrants, which in turn lessens the chance of winning. The effect of imposing entry fees is also considered. These are compared to auctions, merit selection and queuing, all of which impose different costs on applicants. These costs reduce the value of any prize that might be gained and are a kind of negative rent—a payment or cost which has to be made up-front, without any guarantee of winning the prize. Those seeking prizes have to balance the rent they seek (the value of the prize) against the rent that has to be dissipated and decide whether the prize is worth the sacrifice. With analysis, Boyce is able to show that applicants should prefer a lottery over other methods because the benefit is won more cheaply.

There is also form of rent-dissipation which may occur due to bad husbandry. The gamekeepers may feel that permits that are distributed by lottery are of little value. This leads to a disregard for the habitat of the lottery-hunted animals. Because lottery permits generate less revenue than full-market pricing, there is less resource available. The revenues can be very large: Not all states distribute hunting licences via a lottery. For example, in a 1998 auction for a single Calgary bighorn sheep hunting permit, the winning bidder paid $405,000 US. (Evans & Flores, 2001). This cuts both ways: If such a valuable benefit were distributed cheaply by a lottery could raise the welfare of hunters rich and poor. Alternatively, if sold to the highest bidder, the revenue generated could develop more extensive habitat to enable many more hunters to kill something less exotic at less cost. A compromise solution has been achieved in Maine, where 1,400 moose hunting permits were available in 1995. Five of these were auctioned, with 124 bidders making a mean bid of $1956. The remaining 1,395 permits were distributed by lottery among 70,000 applicants. The benefits of this according to Evans & Flores are, firstly, that the administrators can gain some idea of the total benefit which they are distributing. More importantly, given the egalitarian motivation of the curators of public lands, is that benefits are distributed widely at little cost to the recipients, while at the same time extracting revenue from those who can clearly afford it. Fix & Loomis (1998) explain how administrators can discover

the price users might be prepared to pay for access to public resources, using the 'revealed preference' technique.

Kerr (1995) considers a similar set of questions relating to hunting permits as Boyce. Kerr notes that 'the price allocation mechanism has long been championed by economists' for these situations because it is (theoretically) efficient. Nevertheless, publicly owned assets are widely distributed for free in the United States and sometimes in New Zealand, because lotteries 'have been touted as the fairest method'. The managers of these public assets are assumed to have the objective of the most socially desirable outcome, according to Kerr. Lottery has the benefit of transferring the maximum benefit to the customers who pay nothing for their prizes (apart from time spent rent-seeking). But compared to charging full price, these lotteries take more effort and impose more cost on the organization. Pricing is invariably better for efficiency, but using a lottery is more 'fair'. Although Kerr alludes to fairness many times, he does not expand on what is meant by this, other than a reference which says that using a lottery is 'eminently fair'. Later in (Chapter 7) I will return to the vexed question of 'fairness', and try to explain what value customers or recipients of lottery prizes might place on it.

2.4 Is a lottery better than queuing?

Excess demand, when not dealt with by the price mechanism, leads to some form of rationing. Since the main alternative to rationing by lottery is rationing by queuing, it is worthwhile comparing the two. Wimbledon, of course, uses both: As well as tickets which are pre-sold through the ballot, it is proud that a sizeable proportion are still available for purchase on the day of play. This results in queues, sometimes overnight on the streets outside. Football final tickets are also sold on a first-come-first-served basis which leads to queuing. Many entertainment venues print tickets with prices long before the event. They may have a policy of standard pricing irrespective of the anticipated demand. Again queues may form. Given the dilemma that they have

created for themselves by fixed-price ticketing, which is the better way to manage the excess demand: queues or random distribution?

Taylor, Tsui and Zhu (TTZ)(2003) compare distribution by lottery with queuing. Their criterion for judging which allocation mechanism is better is based on the amount of *rent dissipation*—wasted effort, that is caused to the applicants. Assuming that the applicants wish to minimise this wasted effort, TTZ conclude that lottery allocation generally predominates over queuing when the goods allocated are fairly homogenous, and consumers' tastes are fairly similar. They arrive at this conclusion using analysis and simulations. They agree with Boyce that post-allocation trading encourages more applications, which dissipates more rent and reduces the value of the prizes.

2.5 Conclusion

Boyce (1994) reports that there is a consistently negative reaction by members of the public to hypothetical questions involving Random Distribution—the public think that using lotteries to decide would be *unfair* (Khaneman et al, 1986a is one of his sources for this result). But paradoxically, when it comes to sports, and the actual use of lotteries, the public do not seem to mind, as the example of Wimbledon shows. Neither does the random distribution of hunting licences or of tickets for sporting events spark off customer resistance. There is clearly a divergence between the answers elicited by hypothetical questions about random distribution, and peoples' reaction to actual distributions involving lotteries. Perhaps when it comes to 'trivial' things like sporting tickets or licences, a lottery is part of the game?

Superficially it would seem irrational for a commercial sports firm to use random distribution. It can only work if their product is sold at below market price, thus creating excess demand. The economists' solution, staple of first-year economics lectures, is to raise prices to equate supply and demand. All moralistic talk of the

wickedness of touts and black markets would vanish, we assure our students. But that ignores the marketing needs of commercial football teams, and other sporting businesses that need to cultivate an on-going relationship with their fan base. Perhaps Wimbledon tennis management are rational after all, taking a long-term view of their business.

Consideration of what would be the most beneficial distribution method from the point of view of the consumer is welcome. This was presented as an aspect of Welfare by Boyce, and is a useful reminder that the economy exists ultimately for the benefit of people. The automatic assumption that queuing is the right way to deal with unanticipated excess demand is not always valid. A randomisation mechanism can serve the interests of consumers as well. Elicited answers to hypothetical questions seem to show that lottery distribution is unpopular. However, when it is used in a sporting context it is accepted easily.

Chapter 3. Glittering Prizes for Merit

'I have a dream that my four little children will one day live in a nation where they will not be judged by the color of their skin, but by the content of their character. I have a dream today.' *(loud cheers)*[*]

3.1 An example of random distribution: University entrance

When a public organisation selects a winner from a group of eligible applicants, there is considerable interest in the rightness of the process. In a world where selection on merit is held as the ideal, it is instructive to encounter a deviation from this norm. Universities are public bodies, in receipt of state-funding. When they have to choose who should be allowed on popular courses, and of course, who should be rejected, how should they decide? These are not trivial decisions—the award of a place at a prestigious university or to train for a well-rewarded profession is the 'glittering prize' that can lead to fame and fortune.[#]

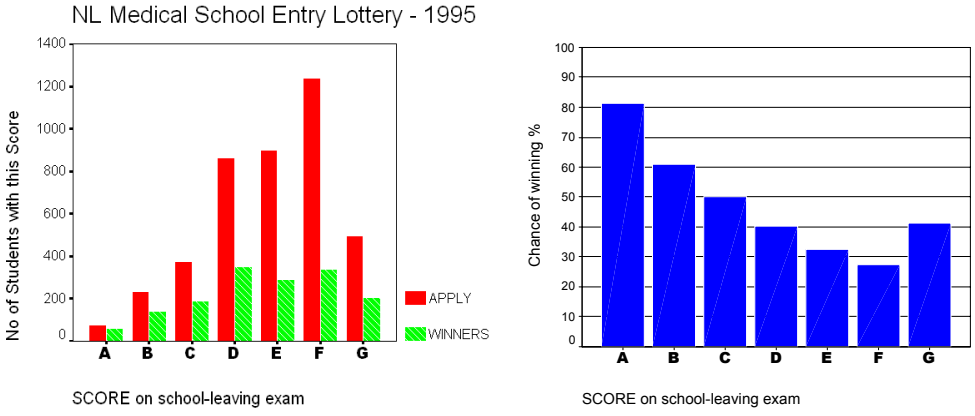
[*] (Martin Luther King speech delivered on the steps at the Lincoln Memorial in Washington D.C. on August 28, 1963. Source: Martin Luther King, Jr: The Peaceful Warrior, Pocket Books, NY 1968)

[#] 'Glittering Prizes' is the title of a 1976 BBC2 serial by Adam Raphael, about a group of young Cambridge graduates winning successful careers in the media.

Example of Random Distribution:

Medical School Entrance in the Netherlands

How the Dutch medical-school entry system operates: Because of a rigid streaming system in Dutch schools, only the top 10% are eligible to apply for university medical courses. Pupils leave school with grades from a nationally-based examination, plus an achievement test provided by their school. Universities are not allowed any other screening devices (interviews, special tests, references, extra-curricular achievements). Where demand exceeds supply, a central committee decides the allocation process. During the 1990s in the case of medicine, about 5,000 qualified pupils applied for the 1,800 places available. The graphs below illustrate the way in which the lottery, weighted by students' grades is used to allocate applicants to courses at the Dutch universities:



The graph on the left shows how the 1995 Dutch Medical School entry lottery worked. The 'SCORE' category relates to results on school-leaving examinations, combining both national tests and a teacher-based assessment. 'A' is the top category, 'F' the lowest, although this is relative: Only pupils from the top 10% are eligible to apply. The category 'G' relates to non-standard entries, such as those with non-Dutch qualifications. The second chart shows how the chances of winning a place vary with the Score achieved. The system allowed students to make repeated applications, and there was provision for appeals.

Source: Report of the Drenth Commission, 1999

3.2 Discussion on the entrance lottery for university courses in the Netherlands

In this case the universities have ceded control of entry to a government agency which allocates students to courses. The use of a lottery as part of this process has been reported by Elster (1992) and others, but the fullest English-language description can be found in a 1999 Report to the Irish ministry of Education, who commissioned Professor Piet Drenth to describe the Dutch system. The system used applies to three courses where demand for places greatly exceeds the supply—medicine, dentistry and veterinary studies. The selection mechanism in use is a hybrid one combining a measure of merit together with a weighted lottery. (This is sometimes called a 'graduated lottery' or 'graduated random distribution'.)

In operation since 1972, the mechanism came under intense scrutiny in 1996 when a very bright student (Meike Vernoy) was rejected for medical school entry, despite gaining near-top grades in her school-leaving tests. Her case became a national *cause celèbre*, and under political pressure the Dutch minister of education set up a commission (*Commissie Toetalting Numerus Fixus*) chaired by Professor Drenth. The Drenth Commission examined and evaluated the existing system and suggested modifications. Its Report published in 1997 stated that the existing system was sound and should not be changed. The Drenth Report provides a useful examination of an existing lottery-based allocation mechanism. The evidence which it collected and presented makes a formidable case for the appropriate use of some form of merit criterion with a weighted lottery being the final arbiter.

Drenth tested the ability of entry scores to predict performance on the course. At the end of the first level, it was found that entry scores gave some indication of time taken to complete the level, and also the success rate. By the time of the finals, this variation had practically disappeared. From this Drenth concluded that the Dutch system is *not* characterised by too many falsely accepted students (who then go on to fail). Rather that far too many students who would have succeeded have been rejected. Drenth, it

seems, would have liked that the lottery aspect was strengthened, with less emphasis on school-leaving scores.

Drenth also examined alternative entry systems which are used in other countries, especially those related to medical school entry: These include greater use of school-leaving scores, special aptitude tests (such as SATs in the US), psychological tests, interviews, references and the use of probation periods. Apart from school-leaving results, none had much useful predictive power, with interviews and references especially useless.

In response to the Drenth report, the Dutch government decided to stick with the basic system, but modify it somewhat. Top-scoring students (A, B and C) were to be automatically given places; the lower scorers would take their chance in a weighted lottery. The politicians had given in to the pressure from parents, rather than heed the considered advice of Professor Drenth. (In private correspondence with Prof. Drenth he tells me that the students, acting through their union, are still keen to promote the use of lottery selection)

The system in the Netherlands is unusual, and it is worth asking how and why it arose. 'The system stems from the pathological Dutch drive for fairness and their intense dislike for making tough decisions' is one (unattributed) quote given by Drenth (in private correspondence). He also informed me that the idea of using a lottery had no champion, no advocate who proclaimed its virtues, nor any academic who demonstrated its worth. The weighted lottery model emerged during the original debates in the early 1970s as a compromise between the leftists who wanted places to be provided for all students to study courses of their choosing, with excess demand settled through a lottery only. The more conservative parties supported by the employers, the medical professions and medical schools favoured selection based on predictors of success, with school-leaving scores the obvious indicator. Since neither side had a parliamentary majority, they compromised, with the use of the lottery, weighted according to school-leaving grades. The system had lasted 24 years without significant complaint, which is a testimony to its effectiveness as well as its robustness. Subsequently, after 1997, that it has largely survived both intense

criticism and ill-informed tinkering is highly encouraging to advocates of random allocation like myself.

Hofstee (1990) who is also Dutch, comments that the adoption of a mixed system of grade scores and a weighted lottery is 'apart from a political compromise, may be taken as testimony to the wisdom of the Dutch authorities.' Hofstee has also conducted research in the Netherlands into the 'acceptability' of lottery selection compared with other methods. Among potential students he found little enthusiasm for single selection mechanisms. In particular, the use of lotteries as a sole means of selection was highly unacceptable. Instead his respondents expressed a preference for mixed methods which involve educational grades, interviews, waiting lists, psychological tests; in short what Hofstee calls 'fuzziness and indeterminacy'. Later a similar questionnaire was administered to 100 Dutch psychology university students. Of particular interest, and in contradiction to Hofstee's earlier study, these students found a lottery to be a most acceptable mechanism for educational selection. As these were second year students, they, or at least many of their school-mates would have been through such a selection process. Their *only* exception to the acceptability of lottery selection arises in employment: For promotions and lay-offs these students thought a lottery mechanism would be unacceptable. Hofstee also refers to an earlier study in 1983 which found that Dutch youngsters preferred a weighted lottery in admission to *numerus clausus* (course with restricted entry) studies rather than either a straight lottery or selection by test scores only.

In the UK there have been some examples of random selection for university entrance reported: Jon Fuller, in charge of post-graduate entry to medical courses at QMC has adopted a lottery (as reported in *The Sunday Times* 14 Sep 2003). At both Leeds Metropolitan and Huddersfield universities students have been selected randomly for physiotherapy courses. (BBC, 27 Apr 2004). Even Schwartz, in charge of the review of entrance procedures in the UK played with the idea, if a report in The Times of 6th Sept 2003 is to be believed: 'Universities to pick students by lottery' was the top headline for that day. In the final report Schwartz (2004a) did not include this as a recommendation.

3.3 Educational Selection on Merit: the Ideal?

Prior to meritocracy, posts and places were awarded by patronage, nepotism, simony and other curious means. (A fuller description of the emergence of 'merit' is given in Appendix A). Parkinson (1958) of 'Parkinson's Law' fame described the introduction of competitive examinations for Civil Service entry as about the best system ever invented for selecting competent employees. It should be remembered that Parkinson was in a position to know, as he was employed as a bona fide management consultant. The word 'meritocracy' was famously coined about the same time as Parkinson's Law by Michael Young in his 1958 social satire 'The Rise of Meritocracy 1870 – 2033: an essay in education and equality'. 1870 was the date when the Trevelyan reforms of Civil Service exam-based entry were introduced. Young predicted that over-reliance on the admittedly highly reliable Intelligence Quotient (IQ) tests to allocate children to different schools, would lead to the stratification of society. In the end, by the year 2033 the proletariat would rise up against their helotry of the stupid. Young was not entirely correct in his interpretation of IQ tests, as I will explain later in the next section. (Although these books were intended to be humorous, they both had a serious intent, and reached a wide and influential audience).

Despite Young's warning, meritocracy is still seen as the model for a better society, where hard-working individuals are allowed to thrive on their merits, rather than who they know, or worse, who their parents were. 'Selection on merit' is widely accepted, particularly in educational circles as the highest ideal. So it is worth examining, firstly how 'merit' is measured, and secondly whether it works—how reliable is measured merit at identifying potential winners and losers.

In practice, selection on merit is a bureaucratic procedure where the element of merit may be determined by objective criteria (a test), but is often left to the discretion of the selectors. The following describes the familiar university selection procedure, which, it would be claimed, is based on merit alone.

Selection on Merit for University Entry: A Gate-Keeping Exercise

Places become available: Every year, University courses have places to fill. There is widespread information and assistance, so any potential applicant should find it easy to discover what is on offer. Minimum requirements will be published, which may cause many applicants to self-deselect.

Initial screening and prioritising: A further barrier may be interposed at this stage: Universities may require more than minimum grades before they consider a candidate, rejecting all below an artificial threshold. Making the applicant sit a test is another special form of screening: Aptitude or intelligence tests such as SATs in the US can be a major determinant of success. Administrators will also sift through the application forms, removing 'unsatisfactory' applications, and highlighting 'promising' ones.

The interview is often seen as the apogee of the selection-on-merit mechanism: Candidates who fulfil entry requirements are interviewed, usually by a panel of academics in the chosen field of study. Winners will be chosen on the basis of judgements made by the interviewing panel, combining assessment of the candidates' performance on the day, information from application forms together with the opinions ('references') of other people who may know something about the candidate.

Greely (1977) describes a particularly elaborate system used for entry to Yale University Law School. Three thousand applications are made for the 325 places available. Each application is read and ranked by three faculty members. It is relatively easy to identify the top and bottom candidates, but the real problem comes in spotting who fits into the 250th to 350th category, where differences in 'merit' will be insignificant. Attempting to pick the 'best' candidates is not just a costly business, it is in Greely's description a 'pretense'. He goes on to point out that random selection would be the fairest and cheapest method.

So can processes like this reliably identify merit? Is merit the *only* basis for awarding the prize of a place on an over-subscribed course?

3.3.2 Measuring Educational Merit: Intelligence and other aptitude tests: a scientific approach

In an effort to establish a more rational basis for selecting and rejecting candidates, and in particular identifying hidden talent, tests of intelligence were developed, starting over 100 years ago, most notably by Spearman. These tests have been in widespread use ever since. The Stanford-Binet test of IQ (Intelligence Quotient), has been widely used, and correlates well with human abilities. Kline (1991) (who is a notable critic of the use of IQ tests) admits that 'the application of psychometrics (IQ testing) is one of the few technological successes in psychology'. He concludes that 'If we take the correlation between intelligence and academic success across a whole range of ability it is likely to be substantial, around 0.5'—that 50% of ability and achievement can be explained by the score on an IQ test. So IQ tests and their close cousin the US SATs tests are valid, quite probably the best, and maybe the only way of identifying those with potential to succeed. The Economist (2005) makes a spirited defence of SATs: 'If universities admitted students purely on the basis of their grades and test scores, as they should, the proportion of successful poor students would actually go up rather than down.' This is not yet 'merit'—in Young's (1958) pseudo-formula he identified Merit as:

Young's (1958) pseudo-formula for M ('merit'):

$$\mathbf{M = I + E},$$

where I is measured IQ and E is effort.

('pseudo' because economists would prefer a formulation $M = f(I, E)$)

Young assumed that measuring both of these would become more reliable over time. In this he was wrong. Measuring IQ has improved a bit, but measuring Effort remains a highly subjective activity, based on human judgement by work-study practitioners.

There are two features of such tests which are often overlooked or mis-understood: they do not provide fully conclusive identification of merit, and (something Young

missed completely) beyond a certain level, tests have very little predictive power in separating out potential failures from those who might succeed.

Tests and error bounds: fuzziness in the measurement

The score on an IQ test is a good indicator of future academic performance. It is easy to think of the relationship as something like this (Figure 3.1):

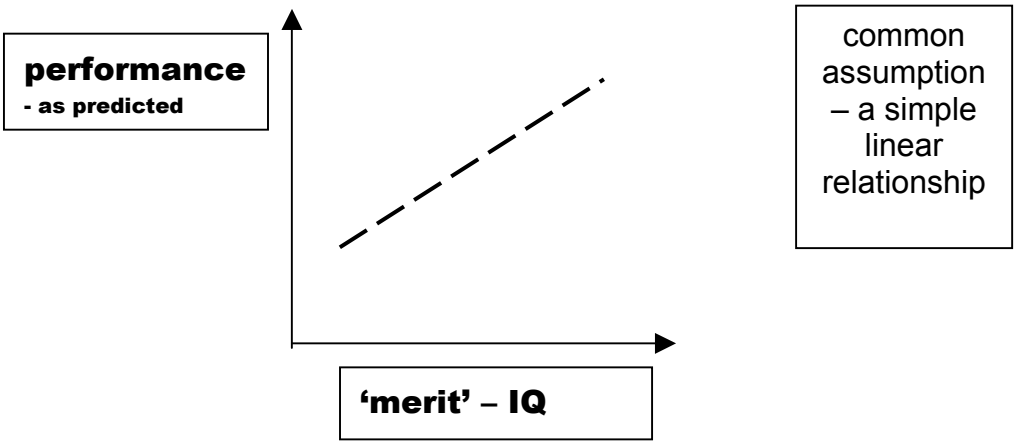


Figure 3.1: Simplistic relationship between measured merit and predicted performance

The graph above suggests that as the IQ score rises, that the Performance rises in exact proportion. Of course, most people are aware that measurement is not an exact science, and there will be fuzziness due to many factors. The relationship shown by Figure 3.1 will then look like:

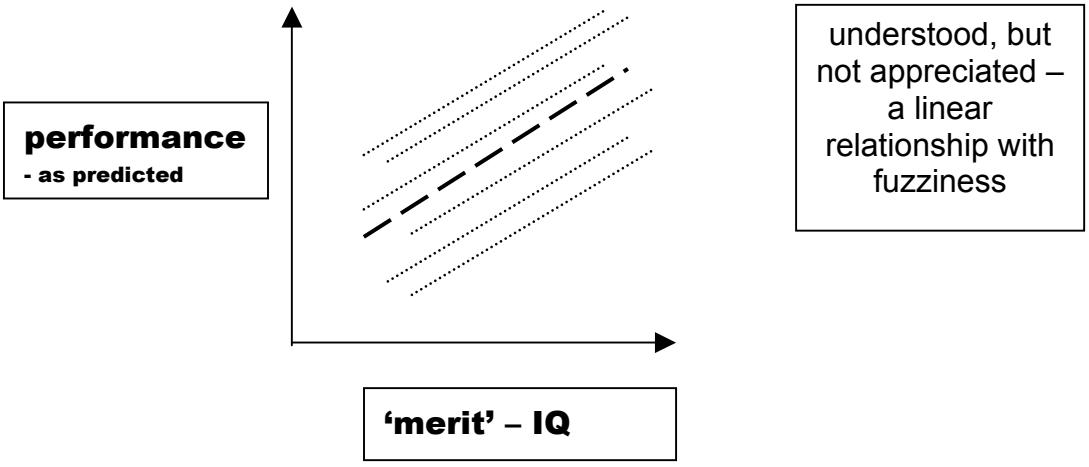


Figure 3.2: Realistically fuzzy relationship between merit and performance

Aware of the likely nature of this relationship, selectors, officials and the organisations will prefer higher 'merit' scores because that indicates a better *chance* of success. This is easy when demand exceeds supply. There is still the risk that because of the fuzziness of the relationship that some failures will slip through. Raising the entry threshold reduces that risk for the selectors. The applicants lose out with many of those, as Drenth indicated, being rejected, despite still having a good chance of succeeding.

To achieve a target quota of entrants, selectors may use an arbitrary score on an IQ test as a dividing line between pass and fail. The old English and Welsh 11+ IQ test was set up to decide who 'won' a place at Grammar School, or who 'failed', and was sent to a Secondary Modern, and was in operation for many years. Typically, the top 25% of scorers on the IQ Test went to Grammars, although the rates varied hugely. According to Vernon (1957), the strict cut-off point meant that many children were sent to the 'wrong' type of school. Because of the uncertainties in the measurement process, it was estimated that 20% of pupils finished up in a Grammar school when they should have been at a Secondary Modern or vice versa. Using more up-to-date information related to university students' performance, Bekhrandia (2002) looked at an entire student cohort, and discovered that there is a significant trend—better entry grades on average predict better final grades. But it is clear that there is much unpredictability in the system: An entrant with 18 points still has a 60% chance of doing as well or *better* than an entrant with 24 points. Elsewhere Bekhrandia (2003) produces evidence to show that pupils from the state sector do much better than those from independent (fee-paying) schools for the same A-level entry points. Independent school pupils need to gain an extra four A-level points to have the same expected degree. This could be taken as an objective criterion to discriminate between applicants.

Non-linearity: more is not always better

If the score on an IQ test or the level of examination grades are sound indicators of future academic performance, then it seems reasonable to assume that the higher the scores or grades, the more likely it is that a candidate will succeed. However in many

cases it is not like this. Performance may generally rise with IQ score, but then tends to level off as shown in Figure 3.3:

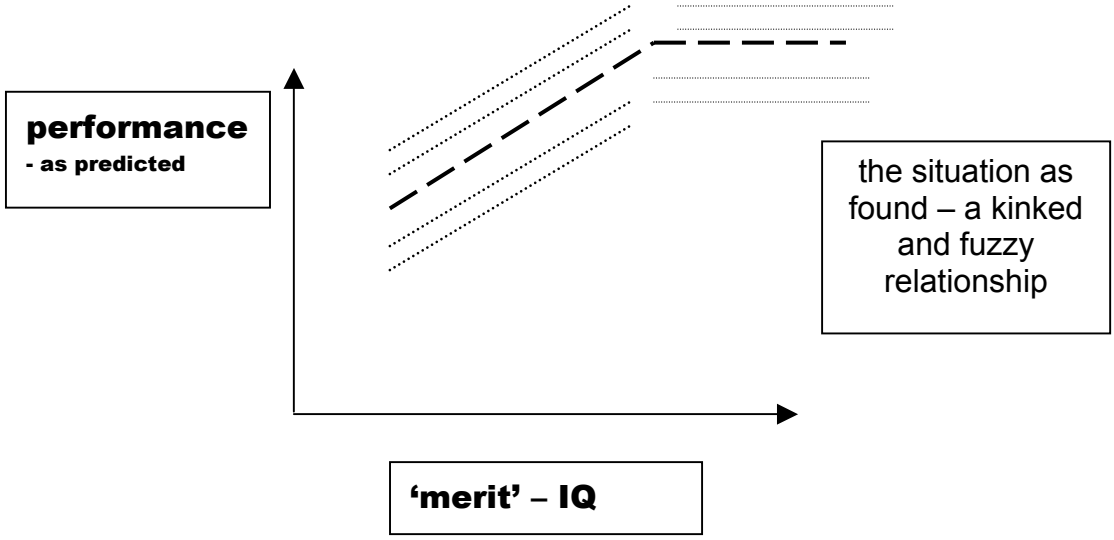


Figure 3.3 Complex reality: IQ scores fuzzily predict performance, up to a point.

There are many examples of entry tests or scores showing a linear, if fuzzy relationship up to a certain level, then flattening out after that:

Pilot training: War time pilot training, like much research based on large-scale military activity shows the non-linear characteristic. Eysenck (1962) showed with a simple graphic (p26) that pilot performance generally increased in line with IQ, but beyond a score of 120 there is scarcely any improvement.

University entrance NL: In the Netherlands Drenth (1999) described the performance of medical students as predicted by their entry grades. Because of the natural experiment provided by random selection, a representative cross-section of eligible students with a range of grades are accepted onto the courses. Drenth concludes that achievement in final secondary school examinations 'does have some, although not very strong, relationship with the study results in the medical studies, especially in the early years (of the course) and if time criteria (time taken to complete) are used. Other predictors have negligible correlations.' Drenth also points out that those in the lowest category for entry qualifications still have a good chance to succeed and finish their studies in a reasonable time.

University entrance UK: Having explained that there is a strong (0.50) correlation between measured IQ and academic performance, Kline (1991) states quite bluntly: (p9) 'if our sample is selected for intelligence (for example at a good university where all students have IQs beyond 120) then the correlation is bound to fail. Everyone has sufficient ability to do the work.' This view is supported by two more recent reports which asked how well A-levels predict final degree classification: Wiliam (2002a, b) studied the results of students graduating from his own institution, King's College. Wiliam concluded that using A-level points to predict class of degree is only slightly better than pure chance. (Since this is an elite university, then this result is in line with what Drenth found in the Netherlands).

The fallibility of human judgment

Since the interview is often the core technique for deciding who has the most 'merit' and should get the prize, the effectiveness of this method should be scrutinised closely. Officials doing the selecting tend to have a high opinion of their powers of judgment. It might be expected that schoolteachers with longstanding knowledge of their pupils could reliably predict their pupils performance. Not so. The predictive ability of the teachers was invariably worse than the 'quick and dirty' 11+ test. (Vernon, 1957). Camerer (1995) adds a much more blunt comment concerning the predictions by experts of post-graduate students' success: 'The faculty's deliberations just add noise'. Simple models, using measurable indices perform well. Adding human expertise seems to make the judgement *worse*. (A fuller extract of Camerer's views is given in an addendum to this Chapter)

Evidence of the ineffectiveness of interviewing as a means of selecting students was given by Steven Schwartz in a submission to the House of Commons select committee on education (2004b): He is quoted as saying '..interviews take place at some of our most ancient universities, and the reliability of these interviews is zero'. He referred to an experiment carried out at Cornell University (Kelman & Canger, 1994) where veterinarian applicants were selected, half with an interview, half at

random. Judging by the results at the end of the course, it was impossible to distinguish between the two groups. 'To me, it [selecting by interview] is the same as flipping a coin.' (I feel Schwartz was using this as a rhetorical device rather than as a policy prescription). Claims by admission tutors that their records showed that they were able to pick out high-flyer were dismissed as 'an illusion'.

A study of the peer review of grant applications (Wessely, 1998) found that overall, the reliability of panels was reasonable: an experiment with a second panel confirmed 75% of the original outcomes. Individual reviewers were far less consistent, showing only 'slight' agreement amongst themselves. The amount of rent-seeking activity is also commented on with the reviewers spending an estimated 115 equivalent-years on applications in 1989, plus a much greater but uncalculated amount by the applicants.

A further problem related to interviews and other subjective selection techniques is that of discrimination. It would be wrong, and against university policy if admissions tutors were to actively prefer attractive young white female applicants over others who were equally qualified. This is an agency problem, and however well-intentioned, it is difficult to control this bias. Public Choice theory would assume that selectors would act in this discriminatory way for their own satisfaction, if given the discretion to do so. Even where selectors are acting with best intentions, and even following training to avoid such discrimination, there will still be unwitting bias. Beyond the recognised forms of discrimination on grounds of gender, race, age and perhaps sexual orientation there are many more human traits and features which either help or hinder candidates in interviews. These will be dealt with in more detail in Chapter 5.

3.4 Consumer Choices

Missing, or at least de-emphasised in many of the treatments of public organisations allocating benefits to applicants, is any notion of customer satisfaction. Roth (2002) describing the mechanism of allocation for interns to hospitals, sees the interns as

having awkward selections that need to be satisfied, but are also likely to engage in trickery to dupe the system. Tellingly, the Schwarz (2004a) enquiry which consulted 25 different organisations, only chose one —National Union of Students—which could be said to represent the views of the proximate customers of the universities. Drenth only revealed to me in private correspondence, not his report, that there were positive views on lottery selection by Dutch students. In all these reports, it is the efficiency of the system, primarily on behalf of the producers that matters, choosing who is best for them. Again Public Choice theory has an explanation: This is an example of 'producer capture', where the producers of the commodity run the distribution system for their own benefit, not their customers.

Perhaps this insouciance about customer's wishes derives from the view that 'beggars can't be choosers'—that applicants to universities are being offered a valuable prize, for which they pay well below the market price. All winners have had a boost to their well-being, so why worry if total consumer reward, both of the winners and the losers is not maximised? I will attempt to identify the net consumer benefit from allocation systems like university admissions, but that begs the question of 'Who is the consumer'? for places on university courses. Consumers are usually the ones who pay. Behind most students are families who are required to pay the majority of the (considerable) expense of a university course—although through student loans, this burden is being shifted more onto the student. Professional organisations and employers are frequently consulted about the content of courses, examination standards and admission criteria. In a sense, they are 'customers' for the product of university courses, and employability is a prime concern to applicants. Government, and the politicians who run it are 'customers' in the sense that, using public funds, they provide a large proportion of university revenues. With such an array of powerful, financially significant interest groups involved, it is not surprising that the views of students count for so little, and are virtually ignored in analysis and reports. Yet it is they who spend time and effort going through the process, and they as individuals who stand to gain or lose thereby.

A significant cost to applicants is the need to obtain higher grades in order to qualify for consideration to their chosen course. Putting in extra effort, or spending more time is an example of rent-seeking behaviour. It might be argued that augmenting one's education by gaining higher grades is a good thing, even for those who fail to get on the course of their choice: A better educated workforce can be more productive. Alternatively, it might be said that the extra time spent gaining better grades, would be better spent acquiring life-skills which would be far more useful in later careers. In a survey which I carried out in 2003 on economics students at UWS (details in Appendix B), my tentative conclusion about 'Rent-seeking' was that students had spent on average about two extra months of their life over and above the basic requirement to be adequately qualified for entry. By any calculation this is a significant cost.

Other aspects of rent-seeking might include behaviour likely to put the candidate into favour with the selector. There is a belief that selectors may be signalling some of the secondary criteria that may be taken into account for selection: Out-of-school activities involving charitable works or energetic outdoor pursuits are deemed worthy; they certainly appear on application forms. The good opinion of teachers is also important, because a reference is needed. This may induce conformist behaviour, and suppression of natural exuberance. In extreme competition for coveted university places some candidates may even deliberately sabotage a perceived rival's work.

Satisfaction with the process of selection is much more difficult to ascertain, but the effort is surely worthwhile. If an alternative mechanism, like appropriate merit combined with a weighted lottery, along the lines of the Dutch system were on offer, then it could be studied. Clearly the Dutch system should reduce the wasted effort of rent-seeking. A constant refrain of those who examine university entrance is that of 'fairness'. Exactly what this means in this context—what is fair?, and in fairness to whom?—is not at all clear. I will return to the abstract philosophical notion of fairness later in Chapter 7. There have been some highly significant developments in the literature of economics which may shed light on this.

3.5 Conclusion: What would a valid test of merit be like?

It is clear that simple tests of ability are vital in identifying 'merit', in the sense of possessing potential to succeed. Grades on examinations are useful measures for such merit and should continue to be used. It is to be hoped that researchers will continue to refine such indicators, the better to assist admissions tutors in their selection, although too much should not be expected—100 years of development have not added greatly to the power of such tests. The relationship between the validated indication of a test, and the ability to correctly choose from a pool of applicants is poorly understood: When large numbers of qualified applicants present, it is *not* appropriate to raise the threshold, and demand higher grades. Some such as Astin (1985) take this partial failure of tests to predict reliably as a good reason to do away with selection altogether. Goldstein made a similar comment on an earlier paper of mine (Boyle, 1998). This is wrong: We should apply validated knowledge where it exists, and admit when our knowledge runs out. At this point other criteria may be applied, hopefully in a transparent manner, but apart from a lottery amongst qualified candidates, it is difficult to envisage any alternative, defensible method of discrimination.

Legislating for such a form of selection processes would not be dangerous novelty. Legislators have for long made piecemeal efforts to make the selection process fair. Since all organisations both public and private owe a great deal to the state that nurtured and supports them, rationalising this interference should not be seen as an onerous new burden, rather a clarification.

Addendum to Chapter 3: Camerer on Judgements by Experts:

Colin Camerer (1995) (p 611-2) puts it more directly: 'A body of literature concerns judgments made repeatedly by people (many of them experts) in natural settings where stochastic outcomes depend on some observable predictors (e.g., test scores) and some unobservables. Examples include medical or psychiatric diagnosis (severity of Hodgkins' disease, schizophrenia), predictions of recidivism or parole violation by criminals, ratings of marital happiness, and bankruptcy of firms. About 100 careful studies have been documented so far**.** The remarkable finding in almost all these studies is that weighted linear combinations of observables predict outcomes better than individual experts can (Meehl, 1954; Dawes, Faust, and Meehl, 1989). In a typical study (Dawes, 1971), it was discovered that academic success of doctoral students could be predicted better by a sum of three measures—GRE scores, a rating of the quality of the student's undergraduate school, and her undergraduate grades than by ratings of a faculty admissions committee. (Put bluntly, the faculty's deliberation just added noise to the three measure index.) The only documented exceptions to the general conclusion that models out-predict experts are a few kinds of esoteric medical diagnosis.

In these studies, experts routinely violate rational expectations by using observable information inefficiently (worse than simple models do). The violations have two common forms: (1) experts often add error to predictions by using complicated interactions of variables (weighting grades from low-quality schools more heavily, for example), rather than more robust linear combinations of variables; (2) experts pay attention to observable variables that they should ignore because the variables are not highly predictive of outcomes (personal interviews, for example). These psychological tendencies can be traced to some of the judgment biases discussed above (e.g., Camerer and Johnson, 1991).'

References used in this extract:

Camerer, Colin *Individual decision making* **in Kagel, John H. and Roth Alvin E. eds** (1995). *The handbook of experimental economics,* Princeton: University Press

Camerer, C. F. and Johnson E. J. (1991). *The process-performance paradox in expert judgement: How can experts know so much and predict so badly,* in **Ericsson K. A. and Smith** (eds) *Towards a general theory of expertise: Prospects and limits*.

Dawes, R. M. (1971). 'A case study of graduate admissions: Application of three principles of human decision making' *American Psychologist, vol.* 26, pp. 180–8.

Dawes, R. M., Faust D. and Meehl, P. E.(1989). 'Clinical versus actuarial judgement', *Science,* vol. 243, pp. 1668–74.

Meehl, P. E. (1954) *Clinical versus statistical prediction: A theoretical analysis and review of the evidence,* Minneapolis: University Press.

Chapter 4. Lucky Numbers – Nice Business

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'The first law of economics: there is no such thing as a free lunch'.[*]

4.1 An example of random distribution: Directory Enquiries numbers

This is an example of public assets being given away by a government agency through the mechanism of a 'ballot' – open lottery, with virtually nil entry cost, and the promise of a valuable prize to the winners of 'golden numbers'. Unlike the sporting lotteries in Chapter 2, those who stand to benefit are not individual citizens or consumers. In this case the winners are private businesses, who enter the ballot with the intention of running a profit-making directory enquiry service.

[*] Attributed to Milton Friedman.

Example: New 118 directory enquiry service: Lottery for numbers

'Oftel is today allocating new telephone numbers to companies wanting to offer directory enquiry services to consumers. Over 80 companies have applied for the new six-digit numbers, which will mean that for the first time consumers will have a wide choice of directory enquiry services. Instead of being tied to the service provided by their existing telephone company, consumers will be able to choose from a variety of different directory enquiry services from a choice of companies. These could include specialist services in other languages or services that connect people directly to the number requested. Oftel initially expects to allocate about 300 different six-digit numbers, starting 118.

To ensure that all companies are treated fairly and have an equal chance of getting the most desirable numbers (eg 118118) Oftel is issuing the numbers by lottery. The first companies drawn at random will get their preferred choice of number.'

(Press release from: UK Telecoms regulator (Oftel) Date: 21 May 2002)

In a BBC2 'Money programme', broadcast in May 2004, it was reported that in the lottery, a small company called Leaf Telecom, owned by Glyn Picton, drew first place. He chose 118 118, and immediately sold this 'golden number' to Chris Moss, owner of The Number Firm in Cardiff, for £2 million. The transaction was completed in one week. When asked 'Did you ask enough for the number?' Glyn Picton replied 'Maybe not, but it was a pure windfall. I paid nothing for it, so it was all pure gain'.

4.2 Discussion on Directory Enquiries numbers lottery

Allocating directory enquiry telephone numbers whilst opening the market to competition can only be a one-off process. The method used – a lottery with negligible entry costs – could only be carried out once; it would be totally disruptive to lease numbers for such services, and re-call them at a later date for re-distribution. So, unlike previous examples of lottery distribution like university entrance in the Netherlands, there is no extended period of use to learn from. This one-off allocation was subjected to scrutiny by the National Audit Office, which published its Report in March 2005. I will be quoting from this Report—henceforth NAO(2005), because of its factual and authoritative nature, although I do not entirely agree with some of the conclusions it draws.

'Oftel decided to encourage competition in the provision of directory enquiry services...in the *belief* that competitive markets benefited consumers.'(my italics). If a belief that 'free' markets provide consumers with a plentiful supply of good quality product at the lowest possible price, then the faith of Oftel has been gravely disappointed. As the NAO(2005) Report explains, consumers have ended up paying higher prices. They have been so confused by the process, that *fewer* customers are using directory enquiries than before. As to the quality of service, Oftel cannot comment: It failed to collect any service quality indicators about the previous BT monopoly service as a basis for comparison. The NAO(2005) Report comments charitably that 'not all consumers have benefited from the move from 192 to 118 directory enquiry numbers, but that the market was still evolving.'

If the end result of this act of market liberalisation has been a somewhat qualified success, what of the process of allocating numbers to the new entrants? NAO(2005) comments 'The actual liberalisation process was handled well by Oftel, following good regulatory practice.' The fact that valuable numbers were given away though a lottery is explained as follows:

Oftel was fully aware that directory enquiries was a valuable business, worth £300 mn per annum in 2000. They were also required by the 2003 Telecommunications Act to

exploit opportunities for sharing in financial gain from the allocation of a scarce resource. This suggests an asset worth £10s of millions was at stake, with the potential sale price from 'golden numbers' such as 118 118 being well understood.

Oftel considered the possibility of charging for the numbers, including running an auction, to maximise revenue. However, having taken legal advice, Oftel felt that the 1984 Telecommunications Act only allowed administrative costs to be recovered, and that an auction might be illegal. They consulted the DTI (Department of Trade and Industry) who gave assurances that auction-permitting legislation could be made available at the earliest opportunity. (Such legislation was passed some 14 months after the 118 numbers were allocated).

Oftel decided that it could not wait and went ahead with the number lottery. There still remained several questions: Should entrants need to show that they were capable of running a directory enquiry service? Should entrants pay a bond of £100 or even £200,000 upfront? Should potential winners be required to set up and run a service? Would winners be allowed to trade their allocated numbers after the ballot was completed? In every case, Oftel decided to take the most liberal option: To avoid any charges of discrimination, and to encourage the maximum number of applicants, there were no entry charges, or any 'arbitrary' requirements to show seriousness of intent. There were some limits on how many numbers any one company or its affiliates could apply for, and BT was specifically excluded from the lottery and post-allocation trading.

In all, 88 companies entered the lottery, and 300 numbers were allocated. As the NAO (2005) Report puts it: 'The existence of a golden number, low entry requirements, the use of a lottery and the ability to transfer numbers combined to create the conditions for a windfall gain for the company drawn out first in the lottery. There were few risks and a low level of financial commitment for new entrants, but potentially high returns. The low barriers to entry and potential rewards attracted an unexpectedly large number of companies to apply for a 118 number and approximately 100 numbers allocated in the lottery were subsequently not used to provide directory enquiries services. Our supplier survey and interviews also indicated that some

companies entered the lottery with the sole aim of acquiring the golden number. The low barriers to entry did, however, encourage many new entrants into the market.'

The justification for giving public assets to private profit-making companies for free is difficult to understand. Generally there is no justification for a lottery to be used when public goods are to be allocated to private, profit-making firms. The use of a lottery indicates an excess of demand over supply because of potential windfall profits. Perhaps Public Choice theory might explain that this is the administrators taking the easy way out (for them). Hiding behind a smokescreen of legislation is a standard trick to avoid taking uncomfortable action. Incentives for the administrators would also be lacking—whatever profits the sale of numbers brought would have no effect on their own salaries. Oftel may have been disingenuous when declaring that an auction could not be permitted.

Oftel's use of a lottery to give away public assets to private firms is not unique: Boyce (1994) gives examples of oil-drilling leases and cellular telephone bandwidths being allocated by lottery in the US. Hazlett & Michaels (1993) looked at the US experience of handing out cellular (mobile) phone licences during the 1980s. They were able to calculate the amount of 'rent-dissipation' (give-away) based on the subsequent prices paid per licence. Airport landing slots have also been handed around amongst airlines in this way at La Guardia, New York, but only as a one-off measure to ease congestion, and prior to raising landing fees (Wald, 2001). The Oklahoma land rushes were rounded off in 1901 with a lottery for the final distribution of free land parcels (Bohanon & Coehlo, 1998). White-water rafting is so popular in Idaho that rationing is needed (Chouinard & Yoder, 2004). The customers are a mix of intrepid individuals, and commercial firms offering rafting holidays. A lottery for rafting permits is run annually, which might indicate that this mode of distribution is the most appropriate. The idea that everyone should have equal access to government-regulated resources 'has been part of the recreation culture for at least the last century' and that a lottery 'minimises the perception that some receive preferential treatment or easier access than others', according to Chouinard &Yoder (2004). This shows that it is the interests of the stakeholders—politicians, bureaucrats and a powerful rafting lobby that sustains this rent-dissipating example of lottery distribution of public assets to profit-making firms.

4.3 Design of Economic Mechanisms: Roth and Binmore

The idea of an economic mechanism is not new, but clarifying ideas about the *design* of economic mechanisms is a fairly recent idea. If, as should be fairly obvious by now, a lottery is *not* the best way to dispose of public assets to private firms, what is better? Simply saying 'Use the market' is insufficient, as the sorry saga of Directory Enquiries liberalisation shows. Economic mechanisms need to be considered more carefully, their effects calculated, and experience elsewhere drawn upon. A promising approach to this is Roth's ideas on 'Economic Design' set out in his 2002 *Economica* paper 'The economist as engineer: Game theory, experimentation, and computation as tools for design economics'.

Design economics, Roth suggests, is 'intended to further the design and maintenance of markets and other economic institutions.' Here Roth refers to 'institutions' in the economists' sense of established ways of doing things. This meaning of 'institutions' can be confusing; 'an economic mechanism' would be better, and fits in with Roth's ideas of economist-as-engineer. Thus a mechanism is any procedure to accomplish an economic transaction: This could be market-based, for money: for example, auctioning off radio-spectrum frequencies; or it could be intentionally outside the market such as allocating housing units to individuals—when, as in the case of social housing or students residences, cheap rents would be charged. My proposal for the use of random allocation as part of a process clearly encompasses the concept of an economic 'mechanism'.

Roth extols the virtues of engineering design with reference to bridge-building. He describes the range of techniques which can also be applied to economic mechanisms. These are both analytical and experimental, and over time can be used to evolve better designs. The application to economic mechanisms is obvious, but it is clear that Roth sees engineering design as a *metaphor*, not a prescriptive framework for economists to follow. As someone who originally qualified as a mechanical engineer myself, before making the transition into economics, I am particularly attracted to the idea of the economist-as-engineer. However, Roth may have missed an opportunity by not

paying more attention to the well-developed field of engineering mechanism design. Authors such as French (1985) 'Conceptual Design for Engineers' or Pahl & Beltz (1988) 'Engineering Design: A Systematic Approach' could usefully be studied by economists. Later, in Chapter 9 I will suggest how a current engineering design technique—Kansei—could be used to improve university entrance procedures.

'Much can be learned from history' says Roth. He refers glowingly to the sociologist Jon Elster, who has published many influential books which discuss methods of allocation including lotteries. 'Local justice: How institutions allocate scarce goods and necessary burdens'(1992) and 'Solomonic choices: studies in the limitations of rationality' (1989) are two of Elster's most significant works relating to allocation outside the market.

A shining example of economic design comes from the UK auction of the 3G radio spectrum. Detailed information can be found in another NAO (2001) report, but the best description comes from the mechanism's designer, Ken Binmore (Binmore & Klemperer, 2002). The mechanism used was described as a 'simultaneous ascending auction'. The details are fairly complex, and had an important bearing on its success. These were the result of two strands of design investigated by Binmore and his team: They drew on detailed analysis of past disposals of radio spectrum, both successes and failures; and they conducted experiments with test subjects, specifically to try out their reaction to the actual rules of the simultaneous ascending auction.

Of course, as well as experience and experiment, Binmore was able to use economic theory to deal with some fallacious arguments: Many commentators felt that an enormous payment up-front would raise prices to consumers as firms tried to recoup their outlay. This is akin, says Binmore, to the mistaken argument that if house-builders are supplied with cheap (below market price) land, house prices would fall. Economists since Ricardo have realised that economic rent, or in this case, bids made in the 3G auction are sunk costs which do not affect market price. A royalty system might seem a better deal for 3G telephone users, but this as Binmore points out *would* increase prices for consumers, in a manner similar to a value-added tax.

In the case of the 3G auction, design economics was the key element in its success. The government took a long, careful look at the problem, and allowed sufficient time for the economic consultants to develop *and test* the appropriate mechanism. Subsequent auctions in other jurisdictions did not always fare so well, mainly, says Binmore, because conditions were different, or the government had other objectives in releasing the spectrum. Specific designs are required in each case—'horses for courses' as Binmore puts it—and off-the-peg solutions may not work. The lessons for anyone thinking of applying an element of random distribution to an allocation process are obvious.

4.4 Conclusion: How best to dispose of public property to private firms

The conclusion seems simple: That there are generally *no* circumstances where a lottery should be used to give away public property to private firms. So why were lotteries used to give away valuable telephone numbers, airport landing slots, some radio spectrum licences? The only explanations seems to be the Public Choice theory ones: That officials make life easy for themselves by holding a lottery; or that influential interest groups conjure up 'difficulties' to avoid an auction. We should not be too unsympathetic to these objections. As Binmore showed, designing the right auction mechanism is not straightforward, and takes time. Governments intent on imposing liberalisation in the shortest time possible may be tempted to take the lottery short-cut, with the acquiescence of their tame bureaucrats.

Chapter 5. Fortunes in the Organisation

5.1 The *lungang*—an example of sacking by lottery

This chapter looks at the operations of what is usually called the Labour Market. Employing organisations can be either commercial firms or public bodies, both making selections from the Labour Force. The most significant aspects of jobs—hiring, firing and promotion—are the result, not of markets in the conventional sense, but of bureaucratic processes, where the agents doing the choosing would claim to be selecting the best person for the job.

Winning a job with an organisation, holding on to it and best of all succeeding within that organisation are the most important gateways to prosperity for most of us. A job confers status and esteem as well as a means of living and is possibly the most significant consumer good of all (a point made by Lane (1991) p246). I will try to make the very difficult case for an element of randomisation to be included in the bureaucratic processes of hiring, firing and promoting. Finding a real-life example has not been easy, and as will be seen, the details of random downsizing in China are sketchy:

The *lungang* : The random downsizing mechanism used in China

The following is an extract from **Estache, Antonio, Laffont, Jean-Jacques and Zhang, Xinzhu** (2004) . 'Downsizing with labor sharing and collusion', *Journal of Development Economics,* vol. 73, pp. 519– 540.

In China, for example, as an overhang of the 'low wage and high employment' policy in the pre-reform era, its public sector is now plagued by a serious labor redundancy problem as it is making an arduous effort to build a market economy. According to the newest estimates, at least one third to one half of the workers in the state-owned enterprises are working without making any profit [.....]

Our results also shed light on the issue of random downsizing mechanisms or *lungang* that are used in some cases in China as well as other economies. [....] The Chinese government has implemented both voluntary and mandatory mechanisms to downsize its public sector. As a matter of principle, straight layoffs are rare and most downsizing is implemented in the form of *xiagang*, under which *xiagang* workers leave their jobs but are still officially employed and paid for a couple of years, then become unemployed automatically. [....]

Under the previous downsizing policies, part of the workers are able to keep their jobs only at the expense of the others who become displaced one way or another. However, *lungang* policy is designed for the whole labor force, at least as a transitional policy, to share the limited positions with nobody being completely laid off. Under this mechanism, the government sets first a downsizing target for each enterprise and the enterprise in turn allocates to each plant a downsizing target in terms of a total wage after downsizing. In other words, the firm de facto implements the allocated layoff target. Thus, it is the government which determines the scale of downsizing but the decisions on how to implement it are delegated to the managers. In practice, [....]the whole staff de facto share the required after-downsizing positions. [..]

5.2 Comment on the *lungang*

Applications of random distribution in down-sizing, hiring or promotions seem to be unusual. Another example where randomisation was used in a labour market context, again in the transition to a post-communist economy was in Poland: During the 'Mass Privatisation Programme' management boards were selected to run one of the 15 conglomerates of 444 existing state enterprises. Which manager went to which board was decided by lot. (Borger, 1995)

Using random selection to produce shortlists has been used in parts of the UK. In the case of *Isonor v Department of Social Security* (1994) it was reported that there were 500 qualified applicants for the 30 or 31 jobs to be filled. For administrative convenience about 440 of the applicants were rejected by means of a lottery. The remaining 60 were then processed in the usual way to produce the 30 winners. The administrator (a Mrs Severn) had received approval from her Directorate for the use of random selection. This was upheld by Judge Hull who commented: 'The question therefore whether a random selection is a fair or unfair system is not one that we need to consider. A random selection system by its nature is non discriminatory and therefore if it is correctly carried out it is not discrimination, racial or otherwise'.

Duxbury (1999, p86) quotes from a 1997 Northern Ireland Equal Opportunities Commission document which positively encourages the use of lotteries for short-listing in employment selection: 'Random sampling offers 'a means of reducing applicant numbers to acceptable or manageable numbers, which, when correctly carried out, does not in itself discriminate either directly or indirectly against an applicant'. There is also cited in the document a case in which an employer decided randomly to select for interview eight of the fourteen applicants who met the requirements for the post of superintendent at a neighbourhood office. One of the applicants who was not selected for interview contested the appropriateness of the method of selection for interview. The industrial tribunal found that random selection is intrinsically non-discriminatory in instances where all those within the pool from which the shortlist is drawn meet the requirements for the job. That random sampling is still acceptable in Northern

Ireland is borne out by this contemporary (August 2005) advertisement for messengers in the Courts, which states inter alia: 'Depending on the number of applications, the NI Court Service reserves the right to use random sampling techniques to select applicants to be invited to attend for interview.'
(from a job description NI Court Service
http://www.courtsni.gov.uk/en-GB/AboutUs/Recruitment/level4customerserviceofficermessenger.htm)

Two other UK examples which may not count are: Slough taxi drivers deprived of their licences by lot in 1972 and a redundancy-reemployment case in Wolverhampton 1992, which were both struck out by the courts. (Details of all these examples can be found on www.conallboyle.com/lottery). Another example, perhaps only indirectly connected to dismissal from a job, is the widespread practice of randomly testing employees for drug use, especially in the US.

The paper by Estache, Laffont & Xhinzhu (ELX) gives a glimpse of the *lungang,* which is a Random Downsizing Mechanism. The process of switching from a command economy to a market one may be a once-only experience for China, but there are many individual firms which been involved in the changeover. The Random Downsizing Mechanism has been used repeatedly, and is, it seems, serving its intended purpose well. In the transition to a market economy the players involved have the following characteristics and objectives:

— The Chinese Government has a policy of avoiding ruthless sacking, so as to maintain social stability. It also wants dynamic public and private sectors, spreading the talent between both. It lacks detailed information about aptitudes of workers even in the public sector.
— The line managers in the public enterprises may have more idea about the talents of the workers they manage, but may be corrupt in two main ways: they may falsely represent the talents of their workers in order to retain the best; or they may show favouritism to friends and relatives to avoid sacking (or may be bribed to do so) .
— Individual workers have to make decisions based on what payoffs and threats are available now and in the future, and whether their talents would enable them to get a job outside. They must also be able to cope with the potential

> regret of missing enrichment opportunities by leaving just before a privatised enterprise took off, as happened with China Mobile.

The actual method used—the *lungang*—is a form of randomized downsizing mechanism. It has been analysed and gets powerful theoretical support by Laffont, both in the current ELX (2004) paper, and in an earlier paper (Joel & Laffont, 1999). 'We have given some foundations to the optimality of random downsizing mechanisms'. In particular, random downsizing can be optimal where there is asymmetrical information. In the Chinese case, the central government had little information about workers' production potential, whereas the local managers could be expected to know something about the abilities and effort of their own workers. The extent to which the managers and workers might collude was also difficult for the central authority to ascertain. Workers may also use their own insider knowledge to enrich themselves in ways which central government do not intend. These were some of the imbalances in information which Laffont used when showing that the random mechanism could be optimal.

'Optimal' is a very reassuring characteristic, and bodes well for random downsizing as a preferred option. It relates to a public-interest, social welfare function, concerned with getting the best out of the productive capabilities of the workers, by ensuring they locate to the most efficient firms. But what about the workers? There are some passing references to the attitudes and feelings of the workers in the state-owned industries due to be down-sized. The need to prevent 'social unrest' appears in a footnote. The extent to which the workers are risk-averse is factored in to the likelihood of their accepting voluntary redundancy. Whether random downsizing is the best option for the personal welfare of the workers and their families is not a question which Laffont addresses.

5.3 Costs of human judgement: discrimination and the law

With changing social mores in western societies it is no longer acceptable to discriminate on grounds of gender or race in employment. Laws have been passed which constrain the freedom of organisations whether they be commercial firms,

government agencies or even charitable trusts and private clubs. This interference goes beyond removal of barriers to entry. It requires organisations to ensure equality of opportunity, to avoid bias in their employment decisions and even to account for inequality of outcomes. Such interference in the operation of public agencies might be understandable. Interference in the operations of commercial firms, which in an earlier age would be deemed intolerable, is now seen as perfectly acceptable, and a basic condition to allow firms to operate. In the UK two organisations have been set up to promote equality especially in employment—the Commission for Racial Equality (CRE) and the Equal Opportunities Commission (EOC). As well as pursuing and enforcing the equality agenda, both produce excellent publications, which I will be drawing on. The problems these Commissions are dealing with are both significant and pervasive: There is evidence that selection committees can be extremely biased (Morgan et al., 1982). The prejudices of individual selectors can also be significant, even where they are unintentional. In a major study Riach & Rich (2002) 'have demonstrated pervasive and enduring discrimination against non-whites and women. Both groups risk being denied employment, housing and insurance purely because of their colour or sex.' This is despite 30 years of anti-discrimination legislation in both the US and the UK.

Costs to businesses

Prejudice and bias can create **two** major losses for the business:

— there is the loss of talent caused by drawing on a deliberately restricted pool. (Although the argument is sometimes heard that a homogenous workforce can be more effective. This is not normally acceptable).

— there are consequences due to the workings of equal opportunity laws. Aggrieved employees can sue for compensation, which may lead to loss of reputation as well as financial costs. Action may be taken against a firm because of systematic bias: for example if it is found that women are consistently paid less than men.

How non-racist or non-sexist selection is implemented is left to the organisation. Exhortation abounds: For example, the equal opportunities policy of my former

university affirms that 'No student or member of staff receives less favourable treatment on the grounds of *gender, race, sexual orientation, age* and *disability',*[*] Training is given to ensure that selectors avoid bias on grounds of gender, race, sexual orientation, age or disability (the five grounds mentioned above). It has to be said that the results of equal opportunity legislation are not as significant as hoped for. Pay and promotion gaps still exist, as regularly reported by the EOC. The 'glass ceiling' which seems to prevent women rising to the highest ranks of organisations is commented on, for example in the Economist (2005b).

Costs to people on the receiving end of selection and rejection

Clearly being rejected because of race or gender creates a loss to the person affected. There are the well-known and recognized forms of discrimination. But the list of grounds for bias could be extended: Riach & Rich (2002) also list age discrimination which is less well researched but is a significant bar to an individual's progress. Investigations have also uncovered many more personal attributes which may disadvantage individuals, despite having equal merits in relation to jobs or promotion:

- '*heightism',* i.e. tall people are more successful than short people are (Economist, 1995, 2002a); see also Herpin (2003)
- *'lookism'* i.e. selectors in interviews are biased towards prettier candidates; (Goodchild, 2005). French (2002) found that 'significant earnings premiums were found for attractiveness for women, but not for men.' Also (Economist, 2003).
- *'hairism'* i.e. bald men are disadvantaged relative to hairy competitors (Guardian, 1995);
- *'weightism',* i.e. fat people are seen as less worthy than their slender counterparts. (Economist, 1999).

[*] When I asked the HR department how they implemented this policy, the answer was instructive. 'This states what we are. No formal mechanisms are needed'

– *birth order* can have a significant effect on career success (Leong, 2001). There can be a significant gap between the achievements of only or first-born and later-born siblings.

This list could be extended, almost without limit. Readers may object that these are trivial forms of discrimination compared with racism or sexism. Investigations have shown otherwise, that real hardship is encountered by those who are perceived as less worthy.

There is even a perverse cost from these equal opportunity policies: There may sometimes remain a suspicion that 'X was only appointed because s/he was a Y' or tokenism as it is sometimes called. The other side of this coin is the resentment that might be felt by members of the majority or preferenced group, being passed over because they did not help fill whatever quota was deemed necessary at the time.

Is randomisation a cure for discrimination?

Discrimination imposes costs on both employers and their employees. Avoiding discrimination is a particular burden for the employers. Randomisation applied to hiring, firing and promoting holds out the promise of eliminating discrimination altogether. By definition, a true random sample is one where every member of the population has an equal chance of being selected. It should be the case that if randomisation is the sole basis for selecting who gets the sack, then discrimination by human agency is impossible. This was certainly the view of the judge in the *Isonor* case quoted in 5.2 above.

I would hesitate before claiming that randomisation will cure *all* discrimination. However widely random selection would be used, there will always be some form of filtering. This may be entirely justifiable, as the next section will show. Not every employment decision can be randomised, so some form of human judgement will surely be retained. But the more selection decisions were subjected to a lottery the sooner would discrimination be squeezed out of the system. One particularly

attractive feature of random selection is that its beneficial effects apply to *all* forms of discrimination. It would certainly attenuate the effects of race and gender discrimination, which have already been legislated for. But it would also be future-proof, anticipating any other form of discrimination which might next be deemed unacceptable, such as discrimination on grounds of age, disability, sexual orientation or any of the other grounds cited above.

5.4 Theory: How much information can an employer know?

If the objective is to find people who will add the most value to the organisation, how much is it possible for an employer to learn about the candidates? This information requirement is not the same as that for the university entry process described in Chapter 3. In educational selection the objective is to find a *group* of students who have sufficient 'merit'. Most will exceed the minimum, so can be accepted without demur (or be winnowed out by means of a weighted lottery). Typically in employment the task is much more narrowly focussed. A small number of candidates are short-listed, who appear to have the appropriate merit. From these a *single* winner must be picked, because the organisation has a need for a person to fill a specific role. The informational question then is: How do you obtain enough information to discriminate reliably between a small number of candidates? Often this small number is just two, and the merits of both are nearly equal. The question then is not how much an employer can know about an employee, rather how can an employer detect a sufficient difference in merit between two candidates to say one is significantly better than the other?

Information is used in many ways in theoretical constructs of the labour market. Candidates may signal their ability by qualifications. Employers may signal what they seek by requiring specific experience. Signalling can become a battle of wits as employers try to make applicants reveal their merits (or their lack), while applicants seek to embroider their achievements. Screening, reducing the field of applicants can be achieved by the form of the offer. Sometimes, as in the case of the Chinese down-sizing exercise the information about employees is limited, although, it is assumed,

the employees know all about their own abilities and potential. This is the 'asymmetric information' situation as described by Laffont and others.

It is certainly true that these signals are used to make employment decisions. For that reason it is worth applicants investing in the right qualifications and experience. But is this just another example of rent-seeking? Are the extra qualifications needed to perform well on the job, or are they being used as convenient screening devices for the HR bureaucrats?

The only information that should matter is the job-related merit which the candidate might possess. Again, I will call on Young's (1958) definition that Merit (M) could be identified as **M = f(I, E)** where I is measured IQ(Ability) and E stands for Effort. In the next three sections I will examine the evidence for each of these elements: What job-related Ability (I) can be identified; how Effort (E) can be reliably measured, and; what indicators of overall Merit (M) can be developed. My purpose here is to show that closer examination of the known facts reveals that there is very little an employer can find out. Even employees themselves know little about their own aptitudes. The theoretical construct of an information-rich situation does not correspond with reality. This becomes crucial when advocating random distribution as between candidates who are not significantly different.

5.4.1 Identifying Ability

What can an employer know about 'Ability' related to a particular job? Can it be identified in a reliable or objective way? Intelligence testing developed within the educational sphere, but the question was soon asked: Could on-the-job performance be similarly, and successfully predicted? Kline (1991) reports a major study on 10,000 employees: This showed that the IQ score of employees correlates with job success, at an average figure of 0.3. Kline adds '*No other ability variable achieved an average correlation coefficient of this size'*. (my italics). Aptitude tests, which aim to measure skills directly relevant to particular occupations, were also examined. On clerical aptitude Kline quotes the view(p124): that 'there is some evidence that tests...can

predict general occupational trainability. Tests are far less useful in the prediction of general occupational proficiency'. More on aptitude testing can be found in Ghiselli (1966).

Personality testing: Since it is personality, or more properly character traits that employers seek—assertiveness, leadership, sociability—it is not surprising that HR departments look for ways of measuring them. There are many agencies which offer to test such traits, some with scientific-seeming credentials: A brief search on the internet will reveal many of these, mostly based in the U.S. The only question to ask is: Do they work? Kline (1991) suggests not: (p10) 'most good intelligence tests have high reliabilities, but in other fields such as personality, this is not so, and great care has to be taken in interpreting any results'.

Vernon (1953) gives an example of a personality test develop by the South African air force to see if their trainees had the 'right stuff'. When scrutinised by the USAAF it gave 'very meagre correlations of 0.1 or 0.2...In fact they were scarcely superior to judgments based on appearance alone.' (p66)[*]

5.4.2 Identifying Effort

Effort is the second component of Young's (1958) measured of Merit. He was happy to leave the measuring of Effort to the work-study specialists, without giving this aspect the close analysis given to measures of innate ability. 'Effort', as identified by the work-study practitioners, turns out to be no more than subjective value judgement. A rating system is applied to each observation of a time element, based on how much 'effort' the worker seems to be putting in. Since piece-work payment depends on the time allowed per piece, calculated as (observed time) x (effort %), a game of ca'canny is played off between workers and the bosses.

[*] In Appendix A are fuller descriptions of objective testing of intellectual ability. There is also a description of how personality tests work, and how to cheat on them.

In an attempt to be more objective 'points' systems can be used to guide the HR selectors, and overcome some of the shortcomings of human judgement. A description of how a points system related to employment issues could be developed is given by Treble (1998). Indicators of performance need to be relevant: Output by bricklayers or coalminers would seem to be activities which can usually be measured quite easily, although factors such as the complexity and quality of work can only be judged subjectively. In the majority of jobs, the diversity of activities and measurement of performance is much more difficult. It may be possible to find some surrogate measure: Audas, Barmby & Treble (2004) gives an example related to a large bank, where employee effort was measured by the number of days they turned up for work.

5.4.3 Measuring overall Merit

The interview: The short-listed candidates are interviewed, usually by a panel of experts (in personnel selection) and interested parties (potential boss or co-workers). The winner will be chosen on the basis of judgements made by the interviewing panel, combining assessment of the candidates performance on the day, information from application forms together with the opinions ('references') of other people who may know something about the candidate. It is worth pointing out that members of the panel may have little stake in their decision: Their prospects within the organisation do not depend on whether their organisation gains or looses from the appointment they make.

Enough has already been said (in Chapter 3) about the difficulties encountered in the process of interviewing in the educational setting, where academic potential should be the sole criterion for acceptance or rejection. Much more difficult to predict is the outcome of the job-awarding process. On the basis of previous performance, probably in a different or lesser role, the selectors have to decide how candidates will perform in the future. Evaluating the past performance might be reliable when an internal appointment is contemplated. The difficulties multiply when the reports of strangers in the form of 'references' are used. Glowing references may be no more than a crafty

method for previous employers to unload a 'lemon'. But all of this is may be no more than a dignified ritual. As the analysts such as Kline (above) point out, human judgement is very poor at separating sheep from goats. Even more scathing is Camerer (1995), who bluntly states that experts make the decision *worse* through application of their judgement. (fuller details were given at the end of chapter 3)

Yet there may still be a little room for human judgement: Cook (2003) gives the example of peer assessment of performance, where individuals in a group are 'surprisingly good' (in Cook's words p74) at predicting who in the group will succeed, and surprisingly honest, too. Even when they know that such judgements will be used for promotion or selection this result remains valid. Kahneman chose the topic of 'intuition' for his Nobel prize-winners speech in 2002. He notes that 'most behaviour is intuitive, skilled, unproblematic and successful'. Whether the same applies to intuitive judgements of fellow humans Kahneman does not specify, but it certainly leaves room for exploration of the value of intuition.

5.4.4 Evidence for small variation in human talent

Football management is one area where identifying 'merit' has yielded a wealth of research findings. Dawson & Dobson (2002) studied the available evidence and came up with some surprising results. The main determinant of managerial success is the value of players at his disposal. So it is money which explains two-thirds of the performance of managers. The rest is due to managerial skill and effort, and residual random unexplained elements, which might include luck. Even the great Alex Ferguson turns out to be 'mediocre'. The better managers are those who can keep a team up with slender resources. Other findings explore what objective characteristics indicate better management performance. As Dawson & Dobson explain: beyond the resources at his disposal, there are some objective characteristics like background and experience that matter to a lesser extent. Beyond that—nothing. What is clear from these findings is that there are no wonder-managers possessed of exceptional talent. Some are a little better than others, but not by much. This point is made in more colourful terms by Bertrand & Mullainatan (2003) who ask if CEOs are rewarded

largely for luck? Their answer is 'yes', with pay corresponding to a skimming (rent-capture) model.

5.4.5 Ranking and league tables

It is often assumed that if it is not possible to measure individual talent in a group of employees, putting them into order is not so difficult. This, it is to be hoped, would enable managers to discriminate between two candidates to decide which one should be sacked, hired or promoted. An extreme example of this was found in the Enron company which motivated its employees by 'rank and yank (sack)'(Greenwald, 2001): Every six months the employees in a sales office were ranked according to their performance; the worst was automatically sacked. The consequences were as disastrous as they were predictable. Sales men and women were under huge pressure to make sales at any cost, to falsely report sales, to undermine their colleagues. Deming (Neave, 1990) fulminated against such procedures as enormously damaging to the company. In many seminars he demonstrated with his famous red bead experiment, that trying to identify the worst employee who could then be sacked was a dangerous delusion. Variations in employee performance arise from many causes, most of which are outside that employee's control.

As an illustration of the difficulty of ranking reliably, I turn again to Dawson & Dobson: They report a league table of 50 top managers (p 268), showing their 'win-ratios'. The differences in performance between managers in any given decile are tiny. Even more tellingly, two pages later using an 'adjusted win-ratio' the rankings change considerably: No 1 becomes No 4, No 37 becomes No 1. Even in this information-rich environment it is impossible to conclusively say who is best.

Cullen et al. (2003) report on the findings of the Chicago schools lottery voucher scheme: Their interest stemmed from the 'natural experiment' this presented. It is assumed that an under-privileged pupil who gains a place at a highly rated school will normally improve his or her performance. This has not been the experience. Average grades have remained the same overall, with no boost to the expected score of the

randomly allocated pupils. This suggests that there are no exceptional schools, no 'super-heads' possessed of charisma to turn a failing school into a winning one. Ranking and league tables tell parents nothing other than the socio-economic composition of the intake (which is very important for social, but not educational reasons). Sadly, random vouchers to allow access to 'better' schools do not even seem to reduce the educational achievement gap between the top quartile and the bottom (according to Cullen in private correspondence)

More generally, under the headline of 'The curse of charisma' The Economist (2002b) reports that 'a flurry of academic research casts doubt on the value of charismatic leadership'. Firms appoint charismatic leaders in the belief that a chief executive can have an almost mystical effect on a company's performance. Research shows that like the football managers above, most of the performance is due to outside factors (state of the economy, state of the market) which are beyond the control of the top manager. The amount paid to top executives bears no relationship to the performance of the company, but in one respect charisma paid off: The high-profile managers were paid exceptionally well for their mediocre performance.

Conclusion on information: What is clear is that 'asymmetrical information' exists even in what appears to be an information-rich environment. Joel & Laffont's (1999) theoretical conclusion that in such circumstances a random downsizing mechanism is optimal seems to apply in nearly *all* circumstances. And if it applies for sacking, then a lottery as part of hiring and promoting should also in theory be 'optimal'.

5.5 Conclusions: the case for randomisation in HR

However much private corporations claim to be subject only to the discipline of the free market, there is a long tradition of interference in their selection and allocation processes. The case for requiring specific performances in relation to selection decisions for public bodies is even more cogent. In advocating the use of randomisation in the processes of hiring, firing and promoting, there is clearly a lack of good examples to underpin the case. The one example given carries the *imprimatur*

of Laffont, who declares that where information is asymmetric, then a random downsizing process is optimal. That is encouraging, but the conclusion is a theoretical one. Further development using experiments and field trials would be needed to establish the mechanism on a sound basis.

If the validated knowledge on selecting personnel is taken into account, *all* selections are subject to uncertainty. In the typical case where a choice is being made between a handful of candidates of nearly equal merit, there is no rational or strictly fair way of accepting one and rejecting the others—and you might as well toss a coin to decide.

That is not a case that will easily be accepted by bosses, personnel officers or the employees. They retain a belief that human judgement or worse intuition must be invoked to decide difficult cases. I accept that this is an attitude that will persist, however unsupported by research or evidence. It may even be the case that well-trained and directed human judgement will, at some time in the future, be developed.

In the meantime, I would suggest a hybrid process: Firstly producing a long short-list using objective criteria, such as test results, where it can be shown that they are relevant. If necessary, reduce this to a short short-list using the now acceptable (Isonor, 1994) mechanism of a lottery. Next, go through the ritual of the interview panel with the candidates ranked from say first to sixth in order of merit. Then roll a die.... or, contrive a weighted lottery, with the first getting six chances, the second getting five, down to the sixth getting a single (1 out of 21) chance. In this way a small element of randomisation could be introduced.

There can be significant benefits for organisations that use randomisation while selecting staff: The ‘agency’ problems of corruption, bribery and doing favours should all be curtailed, as well as removing any suspicion of it. Personnel officers may feel downgraded, not being allowed to exercise their skilled judgement which is one of the most rewarding aspects of any job. On the other hand, their anguish of having to decide who should be made redundant will be alleviated. When the impartial mechanism of dice is used, the decision is in the lap of the gods, not the personnel staff.

For the employees, once they realise that they no longer have to engage in a silly rent-seeking game, acquiring characteristics which might or might not please the selectors, they can put their time to better use. If downsizing strikes, and their number is up, that is not a reflection on their lack of worth, but literally 'luck of the draw'. Given a universally fair and open randomised process of awarding jobs, they can be confident of getting back into a job reasonably soon. By mitigating some of the most demoralising features of the job-system, randomisation *may* be able to improve the level of subjective well-being, which has flat-lined for more than 30 years. (as reported by Layard, 2003)

Chapter 6. Fair Shares in the Common Wealth

6.1 Sharing earning power in the community: The Cavil

Here the context is that of sharing within a group which has some social bond. An essential element is that the members of this community have some personal contact with each other. There are many third-world communities which have producer cooperatives organised around common resources like fishing. How access is determined to these resources can be problematic, when some parts of the 'common-wealth' are more productive than others. Members of the cooperative allocated to the best fishing grounds stand to make the best living. A widespread practice, as reported in Lobe & Berkes (2004) is that the grounds are shared out by means of a lottery. This is called the *padu* in the case of fisheries in Kerala, South India. I had intended to use the example of the *padu* to illustrate how communities share valuable resources with the help of random distribution: It is contemporary, widespread and has been used for a long time. However, it is remote, and many cultural differences might intrude; it would also be quite difficult to do any follow-up research. (Details of the *padu* are given at the end of this chapter). Instead, I have chosen a very well-documented local example of random distribution from the past. In what amounted to a workers' cooperative, this was how coalminers were allocated to workplaces in the Durham mines during Victorian and later times:

Example: Durham Miners and the Cavil

The cavil was an arrangement to allocate miners to specific workplaces which was used in the Durham coalfield in Victorian and later times. Work assignments were made by a quarterly lottery, known as 'the cavil'. On cavilling day, hewers' names would be drawn out of the foreman's hat, the order of draw determining the place at which each pair of hewers would extract coal for the next three months. For the miners, the result of the cavil was far from trivial. Geological conditions varied in the mines, so that some places were easier to hew than others. Pay was by piecework, so the luck of the cavil could move earnings potential up or down by 30% or more for the next quarter. Cavilling was still in use towards the middle of the 20th century, although with mechanisation and later with the closures of the mines, this aspect of life in the Durham coalfield no longer survives. However there is a wealth of accessible documentation concerning the coalmines, the miners, their social setting, and specifically how the cavil was used.

Allocating workers to workplaces would seem to be a clear-cut case of a principal-agent problem, not a mutual arrangement between partners in a community. But the Durham mining situation had many community-like features. The miners lived in isolated villages, bound together by religion (Primitive Methodism). Allocation was made, not to individuals, but to pairs of workers (*marras)* who had self-selected. There was a powerful and effective trade union. There were paternalistic employers who respected 'customs'. The spread-out nature of the work underground gave miners considerable autonomy. Taken together, there was a *de facto* common interest amongst the mining community, which justifies calling the *cavil* a means of sharing out common wealth.

Sources used: Beynon & Austrin (1994), Daunton (1981), Emery (1992), Rowe (1923), Treble (1995, 2001, 2002) and Treble & Vicary (1993)

6.2 Discussion: The Cavil as an evolved institution

Where cavilling came from: The origin of the practice of cavilling is obscure. Rowe (1923) suggests that '..the custom of cavilling probably dates back long before the idea of 'consideration,' (an ad-hoc wage adjustment system which pre-dated the Minimum Wage Act of 1912) and was a rough-and-ready but broadly effective method of doing justice' (p147). Beynon & Austrin (1994) draw attention to the peculiar situation between feudal aristocratic land- and mine-owners on the one hand, and the emerging trade union organisation allied to resurgent primitive Methodism on the other, in a rural village setting: The 'Durham system' as they call it, created 'the spatial and political arrangements, which kept the coal miners separate from the rest of society.'(p368). But 'the village as community (which) became a vital aspect of their identities .....required solidarity that had to be built' (p364), because community also means *distrust*, and solidarity is not a natural thing. 'Methodist trade unionism provided a framework in which *aspects of the old culture (cavilling in the mine,* drinking in clubs etcetera) could expand and develop.' (p365 my emphasis added). The cavil, it would seem, survived into the industrial age in the particular semi-rural isolated village communities in Durham. Once established in a new setting, its use was perpetuated because it continued to perform a useful function.

Cavilling in wide and continuous use: There is evidence that the use of the cavil was widespread and persistent throughout the Northumberland and Durham coalfield, at least during Victorian times, during the first half of the 20th Century, and in some places up to the 1960s. According to Rowe (1923)(p58) the cavil was peculiar to this coalfield, though it was found in a few isolated cases elsewhere. Daunton (1981) implies that cavilling was used in almost all the pits in the Durham coalfield. In his description of variations on the cavil he refers (p10) to dozens of pits which used this practice. The sole contentious issue between miners' unions and the pit-owners was whether the cavil should be based on several pits, a single pit or a single seam within a pit. Rowe notes (p147) 'Hallowed by custom, there is apparently no strong desire on either side in the northern coalfield to end the system (of the cavil)'.

Nevertheless, some mine-owners tried (unsuccessfully) to mitigate some of the losses due to the cavil: As Beynon & Austrin quote: 'Colliery custom is one of the

strongest pleas...and managers cannot be too careful to prevent undesirable practices becoming established. Even while such custom is opposed to county practice and agreement, it is difficult to effect an alteration and in no case can, once established, be altered except by agreement or by application to the Committee. In one such case during the year the owners asked that the practice of the colliery, which was to be idle on cavilling Monday should be brought into accordance with county practice. The application was strongly resisted by the workmens' representatives, and was referred by the Committee to the two Associations, who eventually agreed that it should not be pressed.' (p151).

Other evidence for the widespread use of the cavil, and its extension to uses beyond workplace allocation include: In 1927 the cavil was being proposed (Emery, 1992 p136)) at Ryhope colliery as a means of choosing who should be re-employed following the 1926 General Strike. When special housing was developed in 1906 for aged miners, it was natural that they be allocated by ballot—the cavilling system in operation again (Beynon and Austrin (1992) (p190). There are references to the cavil being used to decide layoffs and the sack (Beynon and Austrin (1994) (p150). As late as 1943 cavilling rules were being established for the Silksworth colliery, and were published in small booklets. (Beynon and Austrin, 1994) (p152).

A very telling piece of primary evidence can be found in Beynon and Austrin (1994) (p150) showing a reproduction of the front cover of *Rules of Cavilling* for Boldon Colliery, and *Cavilling Rules, Agreements, and Awards* for Easington Colliery. That this second rulebook was published in 1927 by the Durham Miners Association (the Trade Union) and not by the mine-owners or their association tells us a lot about the collective power of the Durham miners' trade union.

An evolutionary economic approach would suggest that such a tried-and-tested method as the cavil had to confer significant benefits, which were recognised by the participants of this process of distribution. Witt (1991) suggests (p133) that evolutionary selection operates on performance outcomes, rather than intentions and purposes. I will deal with the possible intention to deliver equity or some form of inter-personal justice in a later section. Here I am examining the dynamics of evolution of the institution of cavilling. As Nelson (1981) explains, if a particular

institution evolves, it must have emerged from a crop of alternatives. If there is pressure to change then better institutions should prevail, so long as alternatives exist.

Were there alternative institutionalised methods of payment available? Both the owners of the pits in Durham and the miners through their Association must have been well aware of payment methods used in other coalfields. A particular form of pooling of knowledge of pit payment practices came out of the Parliamentary Commissions of Enquiry related to coalmining, such as that in 1917 on industrial unrest (referred to by Daunton, 1981).

Alternatives to cavilling might have included:

Day rates: Cavilling was a method of circumventing the inequalities of the piecework system, caused by the inherent geological variability of the coal seams. But not all activities at the pit were rewarded directly by the ton produced. Clearing-up activity was paid by time spent—'day rates', so potentially payment per hour rather than per ton could have been utilised.

Labour-only sub-contracting: Daunton (1981) describes the 'butty' system, which had existed in earlier times, based on a contracted payment to a sub-contract gang, which sounds similar to the technique prevalent in the construction industry today.

Two hypothetical alternatives to cavilling are described and rejected by Treble & Vicary (1993). These are:

Auction: An auction could have discovered the workers' valuations of the different seams available for working. An auction is impractical because of the potential for manipulation, especially because of the tightly-knit community from which the workforce is drawn.

Managerial directive: which allocated workers to seams by *diktat*. This is rejected because in practice it would devolve into an auction (of bribery), or be a point of contention due to favouritism. Nevertheless, this was the system used in the other major UK coalfield in South Wales.

Collective piece-work could have been based on the output of the pit, not individual miners. Such a scheme, which would be akin to the Christmas bonus system in contemporary organisations, did not seem to figure in the Victorian mining industry.

So the cavil seems to have emerged from a pre-industrial age. Its use was widespread throughout the Durham coalfield, and persisted well into the 20th Century. Throughout this time there were alternative methods of allocation and payment available, both actual and hypothetical, but the system of cavilling remained in place. It seems reasonable to conclude that cavil was suited to its purpose, that its cost was justified by the benefits it brought, and that switching to one of the readily available alternatives was rejected as unprofitable.

6.3 The costs and benefits of the Cavil

Compared to simple management allocation systems, the cavil created costs both to the mine-owners and the miners themselves. The costs were substantial, and must have been offset elsewhere by significant benefits to both parties.

Loss for the owners of coal output due to the cavil:

Descriptions of the disruption to the workings of the pit caused by the cavil are given by Rowe (1923): **'**at the beginning of every quarter the pit is in confusion for several days, while the workmen inspect their 'luck', air their satisfaction or their woes, and move their tools, etc., etc., while at the end of every quarter the less scrupulous will not keep their working places in proper condition, since they know that there is very little chance that they will draw the same place twice running'(p58). Daunton (1981) too, comments on the losses caused by the cavilling process: 'for the owners it (the cavil) involved a periodic disruption of output as men shifted about the pit. Cavilling usually took place on a Saturday, which might lead to an early stop; while the actual moving of tools might be left until 'Cavilling Monday' the day on which

new places were claimed, and which led to further disruption. Furthermore, the men needed to learn the characteristics of their new places.'

Analysis of the effect of the cavil was developed by Treble (2001) using data from a single mine (Garsefield Bute). Plotting the output per fortnightly period clearly shows the loss of output due to the cavil. Interpreting the results of time-series show that the loss due to the cavil was similar to the effect of Christmas and over the year amounted to about six days lost output per year.

It is reasonable to assume that the mine-owners were profit-maximisers, so the loss of managerial control implicit in cavilling needs some explanation. Its repeated use caused loss of output, and imposed additional costs because it required a larger workforce. The owners might be able to bear the losses caused by cavilling, using stockpiles to tide over anticipatable shortfalls. In some ways the cavil may have been a benefit to the owners, enabling them to boost their earnings by retaining workers willing to operate on less productive seams, thus enhancing the total return on their investment (a point made by Treble & Vicary, 1993). On balance, cavilling may have been profit-neutral as far as the mine-owners were concerned.

Losses for the miners and their families due to cavilling:

Loss of pay: The quarterly disruption caused by cavilling led directly to loss of pay. Because of the piecework system, loss of output for the owners translated into loss of pay for the miners, equivalent to about six days pay per year (based on Treble, 2001).

The anxiety: There was a psychological cost to the miners and their families, waiting for the results of the cavil, as Beynon & Austrin (1994) quote: 'By and large, the larger proportion of those concerned faced the day with a certain amount of apprehension. If they were in a cavil which gave them the average or above average wage—they had a natural fear for the worst, while the minority in below average wage cavils looked hopefully to the future with full knowledge that things couldn't get much worse. In the main, with few exceptions, men awaited the outcome of the ballot in a

calm and rational manner and expressed their disgust if the result meant reduced pay with the expression 'Just my Bloody Luck' if he liked his beer. His Methodist counterpart would substitute 'Blooming' for 'Bloody', in the expression. On the other hand, if a favourable draw was their lot, many would declare that it was not before time as they were entitled to a break' (p151, quote from Fairbridge)

Uncertainty about future income: The cavil posed a financial risk to the miners: From figures produced by Treble & Vicary (1993) it is possible to identify variations of more than 30% in earnings up and down, from different workplaces. There were schemes to alleviate the worst differences due to conditions, and some of the variation would be due to worker's effort, or worker's skill. But these did not compensate fully, and each miner faced an uncertain prospect, along with his family each quarter.

Better workers lose out: In a more rational allocation scheme, the more adept workers (those with greater skills, and a disposition to make more effort) could have consistently made more money than their weaker brethren, whatever their pitch. This benefit would have been even greater if they got exclusive access to the easiest seams. Yet despite this potential earnings boost, the better workers denied themselves potential earnings and shared out the opportunities with less adept workers.

Taken together, the earnings loss due to the cavilling process, the worry that it brought about future earnings and the deliberate choice by the more adept miners to opt for less than the maximum available earnings amounted to a major sacrifice. The miners may have been well paid compared to other Victorian workers, but they were still poor by today's standards. Any addition to their pay would be of significant marginal benefit. That Durham miners wished to earn more money was demonstrated in a paper by Treble (2002), who showed that improved piece rates encouraged greater effort. All the workers had a strong incentive to earn more. In the light of this, the cavil seems an unlikely arrangement for the workers to accept. It suggests that some powerful motives lay behind the positive acceptance of cavilling by the workers.

What benefit was the Cavil said to bring?

To choose something as costly to one or both parties as the cavil suggests that it conferred significant benefits compared to alternative cheaper, simpler workplace allocation procedures. It is claimed that the intention of the cavil was *justice*: For instance Rowe claims (p146) that: 'The practice of cavilling is supported *prima facie* by principles of justice. It is argued that if one workman is in a very easy place, and makes big earnings without undue effort, while another equally skilled man is in a difficult or 'abnormal' place, and unable to make as much as the other however hard he works, then it is only fair that they should change places at stated intervals.' Daunton (1981) makes a more concrete claim that: 'As far as the men were concerned, the virtues of the system were that the chances of a poor or 'abnormal' place were equalised'. Beynon & Austrin (1994) are quite specific in defining why the cavil worked: 'Through cavilling then, men (and women) obtained a sort of fairness for each other within a hard and blatantly unjust world. It brought a rough sort of democracy to the village where men—no matter how big or powerful—were all equal before the laws of chance.' (p151-2)

Treble & Vicary (1993) use the concept of the Rawlsian Veil of Ignorance to explain the use of the cavil. Drawing lots is non-manipulable, and the quarterly ceremony of drawing names from the foreman's hat demonstrates that it is fair. Insurance is another possible explanation for the use of cavilling. This is implied by the title of Treble & Vicary's 1993 paper 'Equity, efficiency and insurance: Explaining the structure of miners' wage payments in Victorian Co Durham'. Although 'Insurance' can be found in the title, it is not used in the text, but if cavilling is to be seen as a form of insurance, it is a rather odd one: Normal insurance requires regular small payments up-front against an unforeseeable episode of bad luck. The cavil, on the other hand, is an intermittent episode of unpredictable luck, but which has the effect of providing a fairly regular income. As Treble & Vicary point out, significant variations between the earnings of workers (or more accurately marra pairs) remained, *despite* the cavil. Characterising the cavil as a form of insurance seems inappropriate.

Calling in aid generalised philosophical concepts of fairness, justice or equity can be defended on grounds of reasonableness, but fall short of being a proper explanation. In what way is the cavil fair? Is there something about the particular social situation in the Durham coalfield that created a demand for more equitable treatment between the workers? Why might the owners be concerned about treating their workers fairly? Drawing on the newer insights of experimental economics will, I believe, explain what these benefits were, and why they proved so valuable.

One recognisable benefit may have been industrial harmony (compared to other coalfields). No British coalfield was without its major industrial disputes, but one particularly striking difference identified by the 1917 Commission was the low level of industrial unrest in the north-east, compared to the South Wales coalfields. This was elaborated in some detail by Daunton's 1981 paper. Perhaps the cavil was one of the specific factors which had an influence in creating such better industrial relations.

6.4. Theory to explain the success of the Cavil: Inter-personal comparison

Economic understanding of the motivations of reciprocity and inter-personal comparison have been greatly enhanced in recent years with the results from experimental economics. To understand why a distributional mechanism like the cavil had been in such widespread and continuous use in the Durham coalfield, I will draw on these recent psychological insights of experimental economics, in particular from the summative publications of Frank (2004) and Fehr & Schmidt (1999 and 2001).

Frank (2004) offers evolutionary models as a way forward in understanding situations which involve more than self-interest. He suggests that having a need to acquire the resources to survive and reproduce might help explain how a 'taste for co-operation', perhaps manifested in a mechanism like the cavil, might arise. Although the owners may have incurred some losses due to the cavil, they also had some compensating financial gains. It was the workers and their families who bore the main cost of the cavil, without overall financial gain. Without some powerful additional motivation, such sacrifices seem inexplicable. To resolve this conundrum, it is to the interpretations of experimental economics in relation to reciprocity and inter-personal

comparison that I now turn. But before making use of these non-mainstream economics ideas, it is first necessary, I feel, to briefly establish their provenance.

The standard explanations in economics start from the assumption that all the actors are motivated solely by self-interest. This has been challenged by experimental evidence. In a lengthy discussion paper, Ernst Fehr & Klaus Schmidt (2001) *Theories of fairness and reciprocity: Evidence and economic applications* draw together the results of two decades of work in experimental economics which has tested how human subjects actually react in different situations. Frank in his 2004 book *What price the moral high ground? Ethical dilemmas in competitive environments* makes a more forceful case for economics beyond self-interest, including inter-personal values of fairness.

Does this apply to Durham miners?: Perhaps the first question that needs to be asked is: Do results from late-20th-Century subjects have any relevance to Victorian miners? (Is basic human psychology conditioned culturally?) Roth and others have conducted a series of identical experiments in four countries—Israel, Japan, Slovenia and the US, and have found little statistically significant differences between cultures. (Fehr & Schmidt, p36). Other evidence from different countries at varying levels of economic development shows that the size of money reward is unrelated to culture, that it is only the effect of relative wealth that matters. From this it seems reasonable to assume that the Durham miners who were subject to the cavil had the same basic value system as the subjects in recent experiments.

Evidence that Inter-personal values matter: arises from the 'anomalous' results of many of the experiments reported in economic journals. Perhaps the most telling evidence that humans put a value on reciprocal fairness comes from the Ultimatum Game: A sum of money is to be divided between a Proposer (P) and a Responder (R). If R rejects a proposal then both lose. Logically, R should accept any offer however small: In experiments, offers of less than 20% of the sum available were likely to be rejected on grounds of 'Unfairness'. Responders are prepared to act against their own self-interest to penalise behaviour they perceive as 'unfair'. Repeated experiments have found a switch away from 'fair-minded' behaviour to the more

rational 'selfish' behaviour predicted by standard economic assumptions, although convergence is slow.

Objections to extending economic theory beyond self-interested behaviour: Is a taste for fairness simply explicable as another aspect of self-interested behaviour? Fehr & Schmidt admits that luminaries such as Roth, Binmore and Samuelson try to explain away the anomalies of the experimental evidence as aspects of learning, and that there is no need to alter the underlying pecuniary preferences. Fehr & Schmidt contests this. Because the standard economics form of selfishness only emerges slowly in repeated games '..it is difficult to believe that they (responders in a game) make systematic mistakes' in the earlier stages.

Another explanation for seemingly irrational behaviour is that it corresponds to social norms, which come into play during games (Fehr & Schmidt quotes Binmore on this). One problem with this, says Fehr & Schmidt 'is that it cannot explain the huge behavioural variations across one-shot games' (p10) and 'there is compelling evidence that in repeated interactions, subjects do behave very differently compared to one-shot situations' .

Frank (2004) is more blunt in rejecting the rational choice models which only allow that people pursue narrowly selfish goals (p26). Simply introducing tastes for any behaviour which seems irrational leads to untenable conclusions. Frank quotes the memorable example of the man who died from drinking the crankcase oil from his car engine. 'We do not really explain anything by asserting that he had a powerful taste for crankcase oil' (p26).

Fehr & Schmidt concludes that '..an approach that combines bounded rationality with purely selfish preferences does not provide a satisfactory explanation of the facts observed' in experiments involving human economic behaviour. An analytical approach which combines learning and accounts for selfish as well as non-selfish preferences 'is still in its infancy', so is not available as a framework here. Alternatively, 'there has been much progress' in models which retain the assumption of rationality and assume that some economic actors are motivated in part by non-

pecuniary motives. I will now try to apply some of the theories given by Frank and Fehr & Schmidt of fairness and reciprocity.

If 'social preferences' exist as a separate category, what are they? Fehr & Schmidt identifies:

- *Altruism,* a wish to give up something for the benefit of others. Fehr & Schmidt (p13) quotes experimental evidence which suggests only 30% of subjects have truly altruistic motives; 50% behave in a selfish manner.
- *Envy and the effect of relative income* have been identified and understood long ago by Veblen, but no specific evidence is presented.
- *Inequity aversion,* which can either be positive—a wish to raise up some, or negative—a wish to prevent some getting away with too much, a form of spite. Existence of behaviours based on this is evident from experiments, but this is not quantified by Fehr & Schmidt.
- *Intentions* are also examined to develop a theoretical basis for higher (non-selfish) motivations. As well as passively seeking a better outcome for others, players will react to the 'kindness' shown them. Generally, if kindness is shown it will be reciprocated.

Theories of reciprocity and inter-personal comparison in relation to the cavil:
Fehr & Schmidt gives some examples how these insights might translate in to a specific situation. To tie these in to the Durham cavil, I will firstly look at how the individual miner might value the cavil. Next when group processes are involved, what the dynamics of valuing fairness and reciprocity might bring. The overall benefits of cavilling to the coalfield, and for the mine-owners will then by assessed.

Individual miner's value on reciprocity
Frank (2004) stresses the effect of personal contact: In experiments where subjects know each other or have time to become acquainted, then greater fairness in behaviour is found. This is reinforced by the quality of personal contact: if pairs meet and get on, they have a greater chance of behaving fairly or altruistically towards one another (p31). In the Durham coalfield, as with all others, there was the usual daily contact with workmates, both at work and in the village. In addition, there was the strong family structures with fathers, sons, brothers and cousins working locally. But

most of all and specific to the cavilled mines was the 'marra' (Treble, 1995), where most miners paired off voluntarily to work the same pitch but on different shifts. Frank notes (p38) that cooperation amongst close acquaintances is dramatically higher than the norm.

Layard (2003) explained this as 'Reference actors'—the people with whom we compare ourselves. Layard gives the example of the East Germans—happy when they were compared pre-1990 with other communist countries, yet plunged into misery, despite being richer post-unification, when their comparison group became the West Germans. In relation to the cavilled miners, their reference group is obvious—all the other workers employed in the pit, plus others living in the pit villages nearby. The notion of a settled, unchanging community should not be taken too far however: During the two-year period (1890-93) studied by Treble (1995) there was considerable turnover of personnel.

In a close-knit community, working in marra pairs, living in a village close by the pit, with many family members often involved (details of the situation in Treble 'On Marrows' (1995)), inter-personal relationships were highly salient. Because of the isolation and semi-rural nature of the villages, the reference actors were narrowly, locally focussed. Thus the opportunity and necessity of being fair to others was an immediate concern. This concern for the well-being of others could thus find expression through the mechanism of the cavil. When new workers were recruited, they would most probably be drawn from the same background. Becoming part of the cavilled group would confer additional 'membership' by being subject to exactly the same ordeal as existing members.

Group dynamics and reciprocity

As Beynon & Austrin (1994) explain, the natural state of the pit village and the miners was one of mistrust and envy of the fortune of others. It was organisations such as Primitive Methodists, but especially the Durham Miners' Association (the trade union) which created the feelings of solidarity. Once solidarity was established, then selfish motivations would be diminished, altruistic behaviour could come to the fore. Fehr & Schmidt explains that, even if the 'altruists' were in a minority, their

behaviour in enforcing fairness would be sufficient to deter defectors who might wish to change to a less fair distribution of workplaces, which may explain the survival of the cavil.

When dealing with groups, their overall objectives need to be identified. Two possibilities are: To equalise outcomes for each member, or to maximise output for the groups as a whole. Fehr & Schmidt (p28) presents evidence, that in groups, about twice as many valued an egalitarian outcome over a group-maximising one. This clearly corresponds with the results of the cavil—total mine output could have been increased if the best workers were consistently allocated the easiest seams, but this group-maximising strategy was pre-empted by the cavil. The egalitarian option remained in place.

Also in relation to group motivation, Fehr & Schmidt (p39) draws on experimental evidence for the survival of fairness behaviour: A strongly competitive situation tends to crowd out fairness. Maybe this explains why no cavilling developed outside the Durham coalfield. The system of allocation by management diktat prevailed in the other coalfields, which together with piecework created a much more competitive labour market situation. Only the historical accident of a pre-existing 'fair' system like the cavil enabled its persistence in the face of pressures to be more ruthless. Once established with the help of the cavil, the weaker preference for fairness could survive.

Frank (p49) draws on experimental work which shows how co-operators and defectors could be identified one from another. Initially neither type can recognise each other, so they have to be wary. As the two types discover which is which, they can respond accordingly. When cooperation predominates, then sanctions against defection can be relaxed. This might explain why the cavil, once established, was able to persist—the co-operators predominated. It might also explain why other coalfields where the individualistic piecework system was already established would have found it hard to switch to the cavil.

Payoff for the Durham coalfield from the use of the cavil

Positive response to piecework: The use of the cavil may have mitigated some of the negative effects of payment by piece-work. As Frank (p61) points out: 'Workers are notoriously suspicious of piece-rates. They fear that if they work as hard as they can ..management will .. reduce the rate. The literature describes numerous cases where piece-rates were abandoned... If piece-rate decisions were placed in the hands of someone who had earned the workers' trust, both owners and workers would gain'. The setting of piece-rates in the coalfield was a complex process, with outside agencies involved, but the most significant on-site decision was allocation to a given pitch or seam. The cavil constituted a 'someone'(thing) which both parties knew could not cheat, so may have contributed to a more benign result in the Durham coalfield: When a new higher piece-rate was introduced towards the end of 1891 (Treble, 2002) the workers responded by producing more, not adopting the ca'canny approach described by Frank.

Compressed wage differentials: One effect of the cavil is to compress wage differentials. One factor which might strengthen the value placed on wage compression is the extent of what Frank identifies as 'Co-worker interaction'. (p100). His own researches indicate that when there was a great deal of interaction at work, smaller pay differentials were more usual. Since working down the mines is a good example of co-worker interaction, reinforced by the social interaction in the pit village, the acceptability of the cavil in limiting pay differentials can be understood.. Even if, in the short-term, pay varied considerably due to the luck of the cavil, this could be tolerated. In the longer-term there was the expectation that these variations will even out somewhat. As Frank explains (p114) one reason for the acceptability of this is due to a particularly human (irrational) characteristic of measuring with a non-linear valuation scale. It would be painful if some workers were to consistently earn more. The erratic variations of pay tend to be seen as levelling off earnings, even though at the end of a longer period the better workers who make more effort will finish up with more money.

Frank (2004) specifically links the results from the Ultimatum Game with workers' preference, on grounds of fairness, for smaller pay differentials. 'Conspicuous pay

differences within groups are said to summon resentment on the part of lesser-paid workers, and a sense of discomfort and embarrassment on the part of those paid the most' (p94). Under the cavil, any short-term differences in pay arise because of the neutral arbiter 'Luck'; in the longer-term differences will be somewhat levelled out. Thus can the cavil be said to reduce embarrassment, discomfort and resentment.

As mentioned previously there was the low level of industrial unrest in the north-east, compared to the South Welsh coalfields. The manifest fairness embedded in the use of the cavil may have been a specific factor in creating a less hostile attitude amongst the workers.

6.5 Conclusions

In this chapter I have tried to understand the institution of the cavil using two approaches: Taking an evolutionary economics view that the cavil was fit for its purpose, and using results from experimental economics on inter-personal values to show that the cavil produced a desired result, which was worth the financial penalty.

Institutions will evolve whether theoretical validation exists for them or not. In the case of distribution by lot, there is little validation and much condemnation. The Cavil emerged from the distant past, would have been seen by the religious as a vile superstition, and when the cavil was used, left its participants in emotional turmoil. That it survived is testimony to its resilience and usefulness. From their experience, the miners of Durham and their masters learned that the cavil was a boon, even if no theological or academic validation could be found for it.

When human motivation is restricted to mere selfishness, problems of economic analysis become tractable. Adding motivations which value a care for the well-being of others do not as yet succumb to acceptable forms of analysis. Yet these higher motives exist, and can be important. Understanding the nature of the interactions within the workforce in a coalmine, who live in an isolated pit village could not be complete if selfish motives are all that are allowed. The conditions of the pit villages and down the coalmines of Durham were not unique, but as with other places, this

was where people would place a high value on fairness in an interpersonal setting. Cavilling manifested values of interpersonal regard. The role of the cavil in creating and consolidating this community feeling, this belief in combining together for the benefit of all in the community should not be overlooked. For many decades while the Durham pits prospered, every three months the workers, their wives and families were brought together under the influence of a collective lottery. The management may have operated the cavil, but it was the workers representatives who laid down the rules. In a very significant aspect of their working lives, the cavil was a wise compromise which blunted some of the worst de-humanising aspects of industrialisation found elsewhere.

6.6 Appendix: The **padu***—sharing community fisheries*

Kenton Lobe and Fikret Berkes (henceforth L&B) describe 'The *padu* system of community-based fisheries management' in a 2004 article in *Marine Policy.* This relates to a number of groups of in-shore netting fishermen in Kerala, South India. There are some government-licensed fisheries, but L&B describe the informal groups, outside central control. There are 144 sites where catching fish with nets can be carried out, with 78 fishing families in the *padu* arrangement. Over a period of about 20 years, they organised themselves. By 1987, three sub-groups of 21, 31 and 26 fishing families were established, each with their own semi-licit netting areas. Each sub-group started with much in common: they were all Hindu, from the same caste, attending ceremonies at the same temple, which also included political organisation. L&B say that 'One of the key elements of the *padu* system is the attempt to re-distribute fairly by rotating access to fishing locations. All of the (sub-groups)...have instituted a lottery system...to ensure equal opportunity to prime fishing locations.' The go on to describe the details of the lottery, which is held annually at a meeting attended by all the sub-group members. Names are written on slips of paper and placed in a brass pot. Names are drawn by members themselves, in an order determined by a second lottery.

The system is flexible. When some netting sites silted up, it was easy to adapt the lottery, effectively distributing the loss of income throughout the sub-group. The sub-groups take responsibility for their netting sites, with a committee deciding conservation measures as well as resolving disputes. L&B give no indication how new members can join. Perhaps the family/temple/caste structure is sufficiently static to render such questions irrelevant in the short-term. In addition to this example from Kerala, L&B also refer to other informal, local fishery arrangements in Sri Lanka and Turkey which use a lottery to distribute sites among a closed group.

Chapter 7. A Stake in Democracy—citizenship and society

Give me your tired, your poor,
Your huddled masses yearning to breathe free,
The wretched refuse of your teeming shore.
Send these, the homeless, tempest-tossed, to me:
I lift my lamp beside the golden door[*]

7.1 The US Diversity Immigrant Program—the Green Card Lottery:

This chapter deals with Government at its most general, distributing benefits and often burdens to its own citizens, or in the case of the example, to most of humankind. Later on I will discuss the fairness and justice of randomly imposing some of the burdens, such as jury service and compulsory military conscription (known in the US as the draft). This example, distributing entry permits to the US—the so-called Green Card—is a use of random distribution which seems to be an expression of 'republican virtue' at its best.

[*] A verse from a poem, 'The New Colossus,' by the nineteenth-century American poet Emma Lazarus. 'The New Colossus,' describing the Statue of Liberty. It appears on a plaque at the base of the statue.

Example: The 'Green Card' Lottery – 2004

'Green Card is the nickname for document I-551 issued by the U.S. Immigration and Naturalization Service (INS, now part of DHS – Department of Homeland Security). This card, which is actually pink and blue in color today, allows foreign nationals to legally and permanently live and work in the U.S. The Green Card Lottery, or to give it its more correct title **The Diversity Immigrant Visa Program,** is a system where the U.S. government annually issues 50,000 permanent Green Cards randomly selected through a computer. Those people who enter the lottery and are selected by a computer at Williamsburg in Kentucky can emigrate, with their spouse and any children under 21, permanently.

As is to be expected with any Western immigration program, there are restrictions. Only countries that already have a low rate of immigration to the U.S. can enter, while countries whose former citizens have received more than 50,000 Green Cards through other means in the past five years are not eligible. Residents of the UK cannot enter the lottery due to the number of Green Cards issued to its citizens in the past five years. Northern Ireland is considered an exception, as is the Republic of Ireland. Other countries whose citizens are not allowed to enter at present are Canada, China (excluding Hong Kong and Taiwan), Colombia, Dominican Republic, El Salvador, Haiti, India, Jamaica, Mexico, Pakistan, the Philippines, Russia, South Korea and Vietnam. The draw for DV-2005, the current influx, took place in June 2004. Of the 9.5 million applications, the 50,000 'winners' have just been informed that they have between October 1, 2004 and September 30, 2005, to take up the offer.'

(details taken from: http://uscis.gov/graphics/hodoi/divlott.htm a U.S. Government websites)

7.2 Discussion on the Green Card lottery

Despite the fine sentiments expressed on the Statue of Liberty, the U.S. had been operating overtly racist immigrant quotas which aimed to maintain the existing ethnic balance in the US, whilst excluding many, especially Asiatics. In 1989 long after this had become indefensible, the system was changed. Most visas were to be issued for the normal 'deserving' cases based on jobs, qualifications or close family relationship. A further small category—the Diversity Immigrant Visa Program (usually shortened to DV) was to be selected from the world at large. The legislation did not specify the means for selecting the diverse immigrants. It was the administration which organised the process as a lottery, which has been held each year since 1989. In 2002, for example, just over one million immigrants in all categories were accepted into the US (US DHS, 2003). Of these, only about 5% (50,000 out of 1 million) had come through the DV program.

Public Choice Theory says that politicians will respond to electors' concerns, as well as to those of their corporate paymasters. The Economist (2002c) advocates opening up immigration as a means of stimulating the economy for the benefit of all, but particularly for corporate vigour. For the voters, the ordinary citizens, the idea of unlimited immigration, especially of the unskilled from alien cultures, is horrifying. For politicians to propose lottery entry must have required some higher motive than pleasing the electors' basest instincts. Faced with the need to replace existing immigration controls with something less racist, they reached, it seems, for a familiar option: Historically the US military draft took the form of a public draw. Numbered balls (representing birthdates of 19-year-olds) were pulled from a transparent container (known as the 'gold-fish bowl) at a public ceremony[*]. Many US school board voucher schemes make use of random allocation. Lotteries seem to reflect the genuine egalitarian impulse of the American body politic.

If the intention of the DV Program is to select immigrants from a wide range of 'deserving' countries, it certainly seems to be working. Although the Program is not completely open to everyone, the net is cast widely: Countries from which applicants

[*] A photograph of the actual drawing ceremony is shown on p223 in Tashman & Lamborn (1979)

came for the DV-2004 lottery include: Ghana 6,333, Botswana 4; Bangladesh 4,935, Oman 4; Bulgaria 2,843, Malta 3; Fiji 524, Samoa 2; Peru 1,063, Chile 27 (taking the five continental 'regions' used by the INS).

The DV may be open to many, but there are still barriers to entry: The process of finding out about the DV Lottery requires some ingenuity. Once the appropriate website has been accessed, potential applicants discover that there are limitations: Only those who have completed elementary schooling or training are eligible, and they must be a native of one of the countries allowed to enter. Applicants who fail to follow the procedures at the right time will be rejected—which results in millions being turned down. Only one application per person is allowed, with multiple applications causing rejection. Biometric facial recognition technology is used to catch cheats, and ensure that no post-draw trading can take place.

In the 2004 DV Program, of the 9.5 million applicants, only 7 million applications reached the draw. Since there are 50,000 places, each one has about a 1 in 140 chance of winning. A computer at the Consular Center in Williamsburg, Kentucky is programmed to randomly select the winners. Each applicant has the same chance of winning, and there are about 87,000 'winners'. Some fail to take up their offers, others are rejected after scrutiny. Once 50,000 have come forward and been accepted, no more are granted visas. There are also pre-ordained limits on the number of visas awarded to each of the five 'regions' (continents). In the current round only on-line applications are accepted, which creates yet another barrier to entry (details fromwww.travel.state.gov/visa/imigrants_types_diversity3.html)

But the result of the Green Card Lottery is not quite as diverse as intended. According to Barrett (1996) the lottery winners were of better labour-market quality, compared to those immigrants who came through the standard channels. This may reflect hurdles to be overcome in completing a DV lottery application, effectively screening out the less able.

For individuals world-wide, the DV Program can be highly attractive. This is a lottery where the you have a 1 in 140 chance of gaining a prize worth $300,000 with minimal

entry costs. That is the extra amount, on average, that winners can expect to earn over a lifetime of earnings, according to James Smith of the California-based Rand Institute (quoted in The Economist 31.10.02). World-wide, the U.S. is the destination of choice for most would-be migrants.

There may be some venal motives behind the DV Program, with politicians responding to their corporate paymasters. The results may not quite produce the members of the poor, nor huddled masses yearning for a better life for themselves and their families. But overwhelmingly, this is a story of noble motives, with the US establishment acting in the best traditions of fairness and justice, extending a glimmer of hope to millions of people, expressing a unique sense of global inclusion.

7.3 Justice—the highest ideal

Standard economic theory deals with the individual's wants and needs, and how they are satisfied, with self-interest as the sole motive. When the setting was a group of people, whether they be co-workers, neighbours or club members, who have personal knowledge of each other, then inter-personal relationships can be the basis for the value set on fairness and reciprocity. But the Green Card lottery example in this chapter takes things to yet a higher level[*]. Other than basic humanity, those applying have nothing in common, no sense of affinity. The only collective value that the process could confer is Justice.

But is Justice valued as a separate category (in the same way that values of inter-personal fairness are valued differently to self-interest)? There is massive philosophical support for the value of Justice, which is often referred to by economists. For example a paper entitled 'Distributive justice and the argument for an unconditional basic income' by Zelleke (2005) reviews three important philosophical sources who make the case for the *justice* of the market economy: Dworkin, Nozick and of course Rawls. Of these, Rawls's 'A theory of justice' (1971) is undoubtedly

[*] It might be valid to think of the motivation of Justice being higher than Reciprocity, which in turn is superior to Greed as examples of Maslow's (1987) 'Hierarchy of Needs'. This idea also crops up as 'Humanistic Economics' in Lutz (1999).

the most influential and most called in aid by economists. I am happy to do so too: Rawls's first chapter, which sets the tone for the whole book has the title 'Justice as Fairness'. Taken overall, there is substantial support from Elster (*Local Justice*, 1992) and Goodwin (*Justice by Lottery,* 2005) and others that using a lottery to distribute benefit embodies ideas of Justice. People too, are said to 'want' or even 'thirst for' Justice. How valuable this might be on some form of economic calculus is difficult to figure out, but it is surely the case that Justice and Fairness in the wider social setting have some fundamental value, which random distribution can embody and sustain.

7.4 Theory: Fairness in the wider community

The description of fairness was used in the last chapter, but in relation to communities which had some social contact with each other. In this chapter I am using the rather inelegant term 'in the wider community' to indicate a requirement of fairness within a group which may have some affinity, but almost certainly do not know each other personally. There will be shared values, but not personal attachments. The citizens in one country would be a good example of such a wider community. All those applying to enter higher education, mostly from the same state, with universities as national institutions would be another wider community.

What might Fairness mean in the context of 'the wider community'?

Smith (2005) says that 'the descriptor 'fairness' has so many meanings in different contexts that I believe it is best to avoid the term entirely ..except where it is explicitly modelled ..'. However, there are so many references to fairness and its importance, especially in relation to non-market allocations, that I feel it is necessary to examine some of the ways 'fairness' is defined:

Fairness according to Rawls:

Rawls equates justice with fairness, but how does he define fairness? Search as I might I can nowhere find any definition given by Rawls for 'fairness'. Is it a

philosophical concept so obvious that it does not require definition? If people are to be treated as equals, then maybe the strictly equal chance in a lottery gives fairness by definition. Procedures like the US Green Card or the earlier US Military Draft fulfil this requirement, so is that enough to consider them fair, and conforming to Rawlsian ideals? Broome (1990) expands on Rawls' ideas about fairness, suggesting that it 'is concerned only with how well each person's claim is satisfied *compared with* how well other people's are satisfied.' This relativistic approach may ease the requirements for fairness, but still leaves it undefined. 'Claims' give rise to further requirements: everyone's valid claim should be satisfied, in proportion to their strength, which as Broome points out is normally impossible. His solution in the special case where all applicants have equal claims is to select by a simple lottery. Thus, as with the Green Card lottery, even the losers have had a chance of the prize.

Fairness is whatever people say it is:

'The rules of fairness cannot be inferred either from conventional economic principles or from intuition or introspection' according to Kahneman, Knetsch & Thaler (1986b). Fairness can only be tested empirically, in specific situations. This seems to suggest that elicitation is the only way of discovering what is considered to be fair. People, it seems, have an intuitive understanding of what is fair, or at least can recognise it when they see it. But the results may not always be very consistent: A large-scale survey in the 1990s produced the results shown in the Table overleaf. There is a wide discrepancy in responses in different countries.

Table 1. Summary of International Social Justice Project, 1991 findings on attitudes towards rationing and priority setting[a]

	East Germany	West Germany	The Nether-lands	Britain
Choice made by a lottery	40.3%	54.9%	49.0%	30.2%
Choice is made by judging the usefulness of each patient for society at large	18.6	10.2	15.7	26.9
Choice made by following the rules of the hospital	44.2	32.4	56.0	61.2
The patient who can afford to pay most is treated first	1.4	2.7	2.1	6.0
The patient supporting the largest family is treated first	66.8	57.6	44.8	52.3

[a] Percentage of respondents considering the method of choosing between patients to be very or somewhat just.

Source: International Social Justice Project (ISJP) in King & Mossialos (1999)

Elicitation to test for the presence of fairness should be used with caution. When given wide-ranging or hypothetical questions (as in the medical emergency example in Chapter 1), the results may not be reliable, or as in the example in Table 1, particularly consistent across countries. This may be due to framing effects, although Konow (1996) in a number of surveys, found that the responses to specific, though hypothetical questions showed that there was a universality of views on basic fairness. Focussing on specific examples related to actual experience would be more reliable and avoid framing effects. This was the approach taken by Huang et al (2005). They asked if it was 'fair' for hotels to charge different prices as between customers who booked on-line and those who phoned up to make a reservation. They chose this example because 'most people have experience of using this service'.

A statistical approach

I developed some statistical ideas on the use of random distribution in earlier paper in *The Statistician* 'Organizations selecting people: how the process could be made fairer by the appropriate use of lotteries' (Boyle, 1998). There are different methods of drawing a representative sample from a population, but all depend on some form of randomisation. Simple random sampling operates so that each member of the population has an equal chance of being selected. Samples which have not been picked strictly randomly may exhibit bias. Fair, bias and equal chance are ideas that

will be familiar to statisticians, as well as the implications of such techniques—that there will be occasions when a single sample produces a freak result. In the long run such variation will even out. This is a subtle and complex process which is not well understood outside the profession. Statisticians may clearly understand fairness as a product of random selection, but it is not clear whether this corresponds to a Rawlsian concept of fairness and justice.

Sociologists views on fairness

Whereas 'fair' may have a strict scientific meaning in statistics and sampling, fairness is much less clear cut in the social sciences. A useful definition proposed by Elster is that '*Fairness means that relevantly like cases should be treated alike ... it could be argued that even where there are relevant differences, people should be treated alike*' Elster (1989), p. 113). This definition comes close to the way statisticians identify 'not significantly different'.

Zajac and Baumol: Economists views on Fairness and Superfairness

Zajac (1995) in his *Political economy of fairness* considers a wide range of ideas related to fairness. He quotes the sceptical economists' saying that 'anyone talking 'fairness' is peddling self-interest.' He suggests that it is the market which will deliver the most for all, with any blatant inequalities remaining left to be cleared up by income re-distribution through taxation. When dealing with 'positive theories of fairness' produced by sociologists, Zajac suggests that (p104) their theories are too clumsy to be of practical use. He quotes some indicators from Fienberg (1971) about fairness: That there should be like treatment of like cases; and Selection should be on the basis of relevant merit. There is a Formal Principle that '*Equals should be treated equally and unequals unequally, in proportion to relevant similarities and differences.*' Zajac gives no advice how such generalised principles could be operationalised.

William Baumol tries to go one further than Zajac, and propose what he called 'Superfairness'. He produced a book with that title in 1986. (This is before Zajac's book, but he refers to his earlier publications). He refers to Rawls of course, but concludes (p4) that 'despite Rawls....few would claim to have tenable criteria of

economic justice of general applicability.' He notes that price controls introduced in the name of fairness often have malign consequences. Baumol is aware of some of the insights of experimental economics, such as customers having a 'framing effect': That the circumstances of obtaining a good can change their perceived value of it. Somewhat like Frank and Fehr & Schmidt quoted in the last Chapter, he goes on to identify another customer need: As well as customers individually maximising their own satisfaction from their purchases or allocations (the greed criterion), Baumol allows them to make comparisons with other customers: That each individual gets a bundle of goods which he prefers and no-one else has a bundle that he would wish to swap for. This is the No-Envy test. To put it crudely Baumol's Superfairness is any distribution which satisfies both the Greed and Envy* of the consumer. Moulin (1995) has formalised the no-envy test in his *Cooperative Microeconomics.* Brams & Taylor (1996) also discuss methods of fair division based on a 'no-regret' criterion.

7.5 Conclusion: random as fair hence just

The diverse collection of ideas may feel like a formidable case that fairness and justice matter, but this rather neat conclusion is marred by the fact they are philosophical abstractions. However acknowledged or revered Rawls may be, practical economists and policymakers would ask for the evidence. What experiments have be carried out to show that Justice and Fairness are valued beyond self-interest or inter-personal comparisons? The evidence seems to be lacking, although the experimental problems may go some way to explain this: Once a group, even of strangers are brought together, then they establish inter-personal relationships, where fairness and reciprocity matter more. Of course lack of evidence does not prove that justice has no salience for individuals. Given the frequent and widespread positive comments about justice, it has to be assumed that it has value, and that randomised distribution as an inherently fair mechanism delivers Justice.

* In case the reader has forgotten, the other deadly sins are : Sloth, Gluttony, Pride, Lust and Anger

Chapter 8. Why Random Distribution Works

'The engineer is the guy who makes for one dollar what any damn fool can make for two'
(popular saying amongst engineers)

8.1 Review

The context for non-market distribution involving randomisation: In the previous chapters, I have introduced seven different examples of non-market distribution, all of which involved an element of randomness. Each example was chosen to illustrate a different context, some which show where random distribution works, and some where it may be inappropriate:

Ch	*Prize*	*Source of Prize*	*Recipient*	*Allocator*
1	Medical treatment	Public Agency(hospital)	Patient	Doctor
2	Wimbledon tickets	AELTC – commercial firm	Fan	Manager
3	Place at med. school	NL Government	Student	Govt agent
4	118 phone numbers	OfCom Govt Agency	Firm	Oftel
5	Sack from Job	Chinese Govt	Employee	Govt
6	Workplace	Mine owner/miners	Co-worker	Co-worker
7	Green Card	US Government	Anyone	INS

Only the third example—the NL medical school entry—is a weighted lottery; all the rest use a strictly equal means of random distribution. As can be seen from this list, the source of the prizes is always some form of organisation. These may be commercial firms or governmental agencies, and often the prize-winners may be uncertain which. All of the recipients, bar one are people. The one exception, in Chapter 4, is of a government agency awarding commercial firms, rather than individual people.

I introduced some ideas from economic theory with each chapter which will re-appear in the discussion in the sections that follow.

8.2 Mostly it's about designing an economic mechanism

Roth's (2002) ideas about design of economic mechanisms has provided the most important framework for judging the impact of randomised distribution. Of course, managers, politicians and sometimes even economists have long been involved in developing and implementing non-market distributional mechanisms. Generally, these practical people ask just two simple pragmatic questions about an economic mechanism (actual or proposed):

– does it work?

– does it make things better?

Economists, with their tradition of always seeking to optimise, might add a third question: Is this the best that could be done?

Although Roth provides some theoretical ideas for design of economic mechanisms, it is Binmore & Klemper (2002) (B&K) who have provided a hugely successful example. I find their description of design of economic mechanisms more succinct than Roth's. B&K describe the three main elements that went into their design: The first was experiential: They drew on the previous experience of sales and allocations for radio frequencies. To better understand the likely reaction of the players involved in actual auctions, they conducted directed experiments. And thirdly they used economic theory to explain and understand. All three—experience, experiment and

theory—can be called in aid when appropriate, or as B&K put it: 'It's horses for courses'.

The experience element cited by B&K has another dimension: The use of validated knowledge. Before accepting any 'conventional wisdom', it is worthwhile to ask if we have any evidence to support it. For example, most selection processes place great store by interviews, but are they effective? Higher examination grades suggest higher ability, but does that relationship hold over the full range of scores? There are many sources of validated knowledge, not least from the extensive literature coming out of experimental economics.

8.3 Does random distribution (RD) work?

If common-sense deems random distribution to be 'ludicrous', the results of surveys of public opinion do not provide much encouragement either. As was shown in Chapter 1, invariably the public feel that lotteries are an unfair way to resolve acute medical dilemmas. Even in controlled economics experiments, there is little enthusiasm for a lottery over more manipulable distribution mechanisms. Only the example in Chapter 3 of entry to Dutch medical schools reveals any public support for random distribution. The students who have experienced the system are quite positive about the value of using a lottery.

A further problem I have discovered is that even where random distribution has been used, it has not had any champion, any leading figure to promote its use. In the examples in the previous chapters, random distribution was a compromise between warring parties (Dutch medical school entry), emerged from a pre-industrial age (the Cavil in the coal mines of County Durham) or was used as a quick, cheap way of unloading booty (118 phone numbers). In the economics literature, there is little to draw on either: I have only found two articles which directly address the economics of random distribution, starting from an actual experience of its use: Boyce (1994) and the follow-up by Taylor, Tsui & Zhu (2003). Others make use of the 'natural experiment' presented by random distribution to pursue other questions: for example Sacredote (2001) used the random allocation of students to university accommodation

to test if being lodged with a bright student improved the grades of dimmer fellow lodgers. Cullen et al (2003) examined the effectiveness of randomly allocating schoolchildren to schools in Chicago, but only to test if their education improved. Papers such as these do not ask if random distribution was a good idea in the first place. One intriguing theoretical conclusion is given by Jeol & Laffont (1999) is that under certain asymmetric information conditions, randomisation in layoffs can be show to be 'optimal'.

It is only by examining a number of different real-world examples of random distribution that evidence emerges that it can work, and indeed works successfully. The example in Chapter 6 of the Cavil was a random distribution mechanism which significantly affected the lives of a large group of workers. The Durham coalminers were not passive acceptors of their situation, rather they were a well-organised group who had some control over their fate. They chose to persist with the Cavil, as did their employers. The system was in use over many years, and throughout the Durham coalfield, in its time the biggest in the UK. Despite alternatives readily available, the Cavil survived as the preferred option. The evidence is overwhelming that the Cavil, an example of random distribution, really did work.

If the Cavil, a Victorian institution, might be dismissed as irrelevant to modern circumstances, the same cannot be said for the Dutch medical school entry lottery. As shown in Chapter 3, this currently existing hybrid merit and lottery selection mechanism has been in use for more than 30 years. It affects thousands of students each year, but it has not been without its critics. Crucially, it has been subjected to rigorous scrutiny by the Drenth Commission (1999) and has passed with flying colours. Indeed Drenth concluded that the evidence supported *increasing* the random element of the selection and rejection process.

Even where the results of random distribution are questionable, such as the 118 phone number lottery or the Wimbledon tennis tournament ticket ballot, the random distribution *worked*. The numbers and the tickets were distributed, whatever the ultimate outcome. Although random distribution may be rare, it cannot be said to have failed in its basic function of distribution.

8.4 Does Random Distribution (RD) work well: For whom?

Does it work well, better than alternates? begets the follow-up Better for whom? which I want to address first. In standard market transactions, there are two players, the supplier and the purchaser. Their objectives are clear-cut and un-ambiguous: The supplier wants to maximise profit, and the customer/purchaser wishes to maximise satisfaction. This can be elaborated if firms or corporations are taken into account. Firms may also wish to remain in business, corporations may also have a reputation to maintain. Consumers continue to be seen as individualistic maximisers, seeking the best basket of goods for their money.

Non-market transactions will normally be managed by a bureaucratic 'agent' of the organisation which has the asset to bestow. The recipient may be more than just an individual 'customer', but be seen as part of a larger community. Hence those at the heart of the transfer may not share the motivations of those behind them. For simplicity I will identify four entities who are involved in any non-market transfer especially those which involve random distribution:

Principal (Organisation) >> **Agent** → **Recipient** << Community
(1) (2) (3) (4)

I will deal with each of these entities separately. Of course, in some situations, like the fishermen's cooperative in Kerala (in Chapter 6), 'organisation' and 'community' are the same people. Even in the first example (in Chapter 1), deciding who should get the scarce medical treatment, the organisation behind the doctor/agent is a hospital; this in turn may be a public governmental body, and so part of the larger community.

1. The '**principals**': who decide what mechanism of selection/rejection is to be used, can be in either the commercial or the public sector.

1a. Commercial Organisations (Firms): are in business to make (long-term) profit, indeed are required to do so by the doctrine of primacy of share-holder interests. Profits can be enhanced by increasing revenue and/or reducing costs.

But maximising revenue, for example by the Wimbledon tennis tournament organisers ((Chapter 2) may not be pursued to the full. Orderly marketing, or a wish not to antagonise their fan-base, may explain their seemingly un-commercial behaviour. A cynic might argue that this does not detract from the primacy of maximising profits: That giving the appearance of being nice to their customers, nice to their employees and nice to the environment boosts long-term profits. Giving away their products cheaply using a random technique may be just such a strategy.

1b. Public organisations: include Government, politicians, and publicly funded organisations. These are supposed to act on behalf of the electorate. They too will be driven by the presentational questions that concern commercial organisations, as well as a need to constrain costs. Instead of profit, there may be a range of conflicting aims, such as widespread distribution of a service, or compensating for mal-distribution. The Theory of Public Choice reminds us that these politicians may be just as responsive to corporate influence.

2. Agents are the essential bureaucrats allocating the benefits to individuals according to the directives of their principals. Because of the structures of organisations, it may make little difference whether the organisation is commercial or public. There is a great concern that these agents can be induced to align their objectives with that of their principals (Public Choice Theory again). In addition, we should not forget that these agents are human beings, with the normal human feelings and frailties. Their welfare should not be forgotten in the design of economic mechanisms.

3. Recipients are the people who win or lose in allocations. These are the customers, tenants, pupils, parents, patients, job-hunters, employees, or any other role they may be fulfilling at that moment. There seems to be an attitude, for example in Roth (2002), that the recipients are a pesky nuisance who must be fobbed off with something, enough to stop complaints, or from trying to change their allocation. Balinski & Sonmez (1999) found similar problems in Turkish school allocations. I have described this as a 'beggars can't be choosers' attitude. This, I believe is wrong. The promise of free markets is that the customer is king; is delivered the most product at the least cost. When designing or assessing non-market allocations, the 'customer'

should be considered first. *The ultimate aim, and indeed justification of any man-made economic system should be the enhancement of the human condition.* How this is operationalised in actual allocations may be difficult to identify, let alone achieve. I will make some suggestions in the final chapter.

4. Community in relation to a non-market allocation is relative. Group size has a particular significance in judging whether a specific allocation mechanism is appropriate: At the smallest level is a group of people who can know each other on a face-to-face basis. Wider communities such as the employees of a firm or citizens in a province are the next level. Whole countries, or even humanity as a whole can also be the context for allocations. The significance of size matters because of the possible different motivations involved: Self-interested behaviour is present at all levels of course, but care for the well-being of others is more potent in a smaller group. Concern about more abstract notions of justice and fairness are more likely to be found at the wider level.

Wider social benefits may also over-ride individual merit: Consider the allocation of places for entry to medical school: The most likely to succeed (the most meritorious?) are likely to be not just the applicants with the highest A-levels, but who are also female, middle class, and white, with a previous degree (according to statistical analysis by Leslie, 2003). They may also be the candidates preferred by the medical school, but other social objectives may be required or enforced:

—Fairness and equality: would require widening access to other groups.

—Diversity can pay: Learning with a more diverse student group may be useful in a profession which requires contact with the population at large.

Criteria for deciding if RD (Random Distribution) works well

In each of the next three sections I will examine one of the criteria by which any particular mechanism involving random distribution might be judged. These criteria will be related to the objectives of each of the four 'players'—Principals, Agents, Recipients, Community—identified above. The criteria start with the most concrete

(and least tendentious for economists)—Efficiency, especially involving rent-seeking. (8.5) Expanding the criteria will include Reciprocity and Inter-personal Comparisons. (8.6) Finally I invoke the somewhat philosophical criteria of Justice and Fairness, which are seen as very significant. (8.7)

8.5 RD works well for whom: Efficiency

(1). Efficient for the Principals: Organisations both public and private:

Efficiency for firms and organisations in both public and private sectors is broadly similar. Of course both will seek a distribution mechanism that works, and does not come apart post-allocation. I will be dealing with these system-wide considerations later in Section 8.8. Here I am concentrating on the organisation-specific efficiency considerations. For them it is always worthwhile to reduce input costs while at the same time achieving the same or greater outputs. For example, in personnel selection processes, using random allocation is generally very efficient (cheap) compared to the complex procedures required by conventional merit assessment. A large organisation may find setting up merit selection procedures a relatively minor cost, but smaller groups may struggle. In the case of the allocation of social housing, a large Local Authority can pursue the ideal of a complex points-systems. A small Housing Association, having few units to allocate to 'deserving' applicants should mirror the system devised by the large Local Authority (Council) housing departments, but the administrative burden would be considerable. How much easier and cheaper for them to announce simple objective entry criteria, invite applications and run a lottery if demand exceeds supply.

Reducing administrative costs is one way that random allocation can be more efficient, but what of the outcome? Commonsense decrees that the more effort that is put into the selection, especially to identify merit, the better the result. This, as Drenth (1999) was able to show in the case of selecting students for courses is a delusion. Even using the simple available measurements gives very weak predictive power. To re-iterate the argument in Chapter 3 on 'merit': The relationship between merit score and performance is almost flat in the likely operating zone, since all applicants have

been pre-selected to some extent. There is a great deal of 'noise' in the system meaning that any trend has a lot of variation about it. A top-merit candidate is almost as likely to fail as is a lower ranked one to succeed.

The same strictures apply to employment-related selection. From what is known about valid methods of identifying talent (see Chapter 5) most of what goes on can only be described as 'dignified ritual'. Selection by a random process, with some defensible eligibility criterion will give results which are hardly worse than any form of 'merit' screening. There can also be positive benefits for the organisation: Cook (2003) says that some of the most elaborate selection procedures—he cites the case of the UK Foreign Office—tend to pick the usual pleasant, loquacious candidates, who mirror the characteristics of those already inside. A benefit of random selection is that it will throw up a few oddities, especially beneficial in bureaucracies which are prone to getting stuck in their ways. This is only speculation, but I believe that the 'grit-in-the-oyster' from random selection could enable just the right kinds of mutation to allow the organisation to survive by evolving.

Achieving more effect through randomisation? Rationally, the value placed on a 10% chance of a £100 prize should be the same as a certainty of £10. This may not be how human psychology works. Perry, Erev & Haruvy (2001) suggest that if motorists became aware that some speeding violators were to be given 'bad lottery immediate punishment' this would be more effective than a fixed penalty fine for everyone caught. Their results were based on experimental work. They suggest that 'large rare punishments are stretched in effectiveness through the use of lotteries'. Another example, this time based on an actual lottery is given by Hassink & Koning (2005). They studied a Dutch firm which was trying to reduce absenteeism. To encourage attendance, regularly attending workers were entered into a lottery, with a small proportion publicly winning 75 euro. The results for the firm were spectacular: For an expenditure of 525 euro they achieved a return of 5,760 euro. As an explanation H&K speculate that 'Workers may be intrinsically motivated to participate in the lottery, just because of fun.' Both of these examples raise the intriguing possibility that the value of a randomised prize will be perceived as greater than its deterministic

equivalent. There may be significant potential for organisations to boost their effectiveness through randomisation.

Protecting the organisation: Organisations are already compelled through anti-discrimination legislation laws to treat people in a non-racist, non-sexist way. Other legislation may follow covering age and other categories. To comply with this requires some effort by organisations, such as staff re-training and monitoring of employees. Failure to comply even if unintended may give the organisation a major financial or reputational problem. Since random selection is inherently fair to *all* groups and classifications, it will provide a defence that no discrimination witting or otherwise has taken place. Random allocation is even proof against any future anti-discrimination legislation.

Controlling the agents Corruption is an ever-present problem in organisations, and is one reason why random selection has been used in the past—for example, distributing government posts amongst the ruling oligarchy in renaissance Venice. Since lottery results cannot be predicted, they cannot be fixed. In a modern British setting, especially in the public service, protection against corrupt behaviour may seem superfluous, but not entirely so. Lord Bancroft (1995), former head of the British Civil Service says that 'it is natural for bureaucracies to be corrupt'. The more the distribution mechanism is determined randomly, the less possible it is to corrupt it. A fully randomised distribution is incorruptible.

Effort by the agents: Above all, the principals want their agents to exercise diligence on their behalf. Financial incentives may work in some cases, but are not usual for people-selectors like admissions tutors or housing managers. Instead it is hoped that the agents have sufficient intrinsic motivation to do a good job. I accept that superseding professional judgement by the use of random procedures may lead to de-motivation. Alternatively, since selection can safely be reduced to a simple fact-checking process, lower grade staff can be employed.

(2). Efficient for the agents: What's in random allocation for them?

De-skilling, demotivation Because random allocation removes some of the need to exercise judgement by the agents, this may turn 'knights' into 'knaves' to use the labels developed by le Grand (2003). It may be personally rewarding to imagine one possesses special skills and uses them on behalf of one's principal. It is de-motivating to be told that such skills are ineffective, mere ceremonial.

For some situations, for example doctors deciding who should get a scarce treatment, there is still a great deal of clinically autonomous judgement required. For them, a random distribution would be a rare event. But in most human-resources type selection I envisage an element of random selection could be near-universal, with 'judgement' little used. This could lead these agents into a moral hazard: They may become complacently dependent on random selection, mistakes being shrugged off by comments like 'Well what do you expect? It's only a lottery'. If as suggested in the last section, lower grade staff were to be employed, they would have neither the ability or the incentive to seek out the better, yet still valid merit criteria.

Avoiding agent anguish Many of the agents' decisions are difficult because the involve inflicting losses. Deciding who should be dismissed in a redundancy, or even failing to award a job to a well-qualified candidate brings woe to both parties. Having a lottery shifts the burden to a neutral non-human arbiter. If the organisation is small-scale this intensifies the potential grief of sacking or job refusal, so random selection should be particularly helpful here.

Drive out false pride A particular delusion that some agents may harbour is that they are special, just because they are in the fortunate position to select people for some highly desired prize, such as a place at medical school, whereas in fact they are only 'rent-awarders'. Pride may lead them to believe that popular equals intellectually demanding, which in turn leads them to accept only highly qualified applicants. Boosting the strength of the signal required forces the applicants to make more

(unnecessary) effort. Selection with the aid of a lottery removes this malign effect of false pride*.

When agents reach the top of the greasy pole within organisations they seem to become not just knavish, but swinish in respect of their own pay. Grossly inflated salaries are justified, in part, as a reward for exceptional talent. If agents had reached the top through a regular process involving random selection, they would have less reason to make such claims. On the evidence, for example on football managers, there is little reason to expect worse performance in the job either. Thus the salary bill for the organisation could be significantly reduced.

(3). Efficient for the Applicants and Recipients: The people on the receiving end:

Rent-seeking and signalling: Rather than the market, comparison with conventional 'merit' selection is a much more appropriate way to judge random allocation. Where selection is on 'merit' (the standard contemporary mode) and there is an excess of applicants, then a complex charade ensues: Since all have the necessary basic qualifications, then those with better grades will stand out. When everyone has top grades then this fails to give out the required signal, so secondary characteristics are invoked—an elaborate C.V. of good works might be looked for.

Investing in these extra 'merits' may pay off and win the prize. It may also have some benefit for all the applicants. Gaining more qualifications may benefit the economy generally. What is clear is that many applicants spend a great deal of time in order to gain these extra 'merits', not as an essential pre-requisite, but just as a signal, a form of wasteful rent-seeking. If the merit requirement is limited to what can be shown to be significant in predicting success, with excess demand dealt with through a lottery, such waste could be eliminated.

* A good example which seems to have taken this advice : At Huddersfield University the physiotherapy course was heavily over-subscribed. Instead of increasing the entry requirements, which they knew was an irrelevancy, they chose to award places by a lottery (personal correspondence with the V.C., Aug 2004)

Another perverse signalling effect could also be eliminated by random allocation: If a course advertises that it will only accept top-scoring students, this creates a challenge and a lure. Students who feel they might be good enough may be tempted into that field, just because they can gain entry. An honest statement of the real, if more modest entry requirements, to be followed by a lottery could act as a screening device. Applicants would then be more likely to chose an appropriate course.

(4). Efficient for Society: How it might benefit from the use of Random Distribution

If a significant fraction of the energy dissipated through rent-seeking could be saved, then a large resource could be liberated for more useful social goals. In one small example, I estimated that students were each spending, on average, two extra months of their time to gain unnecessary extra entry qualifications. (see Appendix B for details). The alternative opportunity implications for this wasted resource are obvious. So too are the potential tax-reductions brought about by public bodies becoming less wasteful through the use of randomised procedures. Commercial firms could also produce more cheaply, benefiting customers.

8.6 Works well for whom: Reciprocity and Inter-personal Comparison

Since this is about emotions, there is no need to consider *things* like organisations. In the context of a group of *people* who interact with each other in an economic transaction, the idea of reciprocity has been explored by experimental economics. From numerous cases it has been shown that individuals do not act in systematically self-interested ways. They have a care for others in their group, and feel better by being nice to them (Layard, 2003). As explained in Chapter 6, this benefit of 'altruistic' behaviour should not be seen as just an add-on to consumer self interest. As Frank (2004) insists, values of fairness and reciprocity are in a different domain to those of greed and self-interest. Oxoby (2003) has modelled an extension to allocation process satisfaction which includes the value placed on inter-personal comparison, which may provide a framework to measure its significance.

Compared to distribution through the market, random allocation seems to have a fundamental weakness: Benefits do not finish up with those most eager for them, as measured by willingness to pay. It is always possible to imagine that some prize-winners in a lottery would be willing to trade with others for money. But direct comparison with the market may be inappropriate. When non-market allocation is used, be it by lottery or on merit, it is reasonable to assume that collective values are involved.

Attempts have been made to modify existing lottery mechanisms to make them give a more market-like result. For example, a paper by Hyland and Zeckhauser (1979) was specifically motivated by the housing lottery for students at Harvard. To produce a more market-like result required two main assumptions: first that 'money is not an acceptable instrument' in this allocation (heavily qualified by a footnote), and secondly that 'each person's preferences are assumed to concern solely his own assignment'. They then proceed to develop a clever algorithm which would produce a more market-like result.

This seems to deny significant features which are the essence of the Harvard student housing lottery. The university authorities must have their reasons for using a non-market allocation procedure, so it seems perverse to try and impose a market structure. Also, it is surely unrealistic to assume that in a community of undergraduates they would all be indifferent as to the 'luck' of their fellows in housing allocation. The lottery symbolises the wish of the authorities to act fairly towards the student body. The ceremony of drawing lots which is used in some US universities could be seen as part of the process of creating that community feeling.

This good feeling of knowing that others in a group are benefiting could apply equally in isolated mining communities, as well as for ad-hoc social groups like members of an office or a faculty. Whilst individuals might prosper by ruthlessly competing with their colleagues, it leaves a bad taste. Advancement on some merit, mediated by random arbitration should promote self-esteem, willingness to co-operate and ultimately happier individuals.

Lottery: Unpopular so bad for recipients' welfare? The ultimate arbiter of the validity of an allocation system is how it works for the people it is meant to benefit. However technically satisfying a mechanism might appear, if people genuinely don't like it then it has failed. As explained before (Chapter 1) in surveys people do not like the idea of allocation by lottery. A possible reason for this, as Anand (2001) explained is that a lottery deprives the customers of a voice in the procedure. In another survey, Benz & Stutzer (2002) identified the positive effect of 'voice'. From a survey of British workers they were able to identify that having some say in the procedure for setting wages made the workers happier. This might suggest that a lottery, which would deprive customers or employees of an opportunity to haggle, will deliver less 'procedural utility'. However, where it is actually used, random allocation seems fine—witness the US student housing lottery, or how lottery is enthusiastically endorsed by Dutch student opinion. There is need to explain the benefits of random distribution to the potential recipients.

Can random distribution save workers' co-operatives? The prospect for workers' cooperatives is not promising. A paper by Kremer (1997) asks: Why are worker cooperatives so rare? They should, he claims, have the edge over shareholder firms, because of their tax advantages, greater ability to monitor the workers, and because they satisfy peoples' wish to be involved in running their own workplace. There are some well-known examples of coops: Mondragon in Spain and plywood works in the U.S., but these are indeed rare. Worker coops lose their competitive edge, says Kremer because of their democratic structure. The median (in terms of ability and effort) worker will vote to compress wage scales: the extreme example is that of legal partnerships which usually grant equal pay to all partners at the same level. This dulls incentive effects, and leads to a less efficient firm. Kremer also acknowledges that a particular problem with worker control is that it often degenerates into disputes, involving mistrust and envy, a feature which was also present in the Durham pit villages. In the Third World there is the strong social matrix of the community that binds worker cooperatives together. In more open societies, this disputatiousness may be a much more significant factor in the dissolution of worker coops, rather than any

inefficiency due to compression of wage differentials (which Fehr & Schmidt claims would actually be a beneficial characteristic).

To rescue worker cooperatives from their own inevitable inefficiency, and demise in the face of capitalistic competitors, Kremer says they need better institutions. They need less worker control, and some kind of independent arbiter to resolve disputes. This is what the cavil did for the quasi-worker cooperatives in the Durham coalfield. The most significant wage-differentiating decision was taken, not by a manager or a co-worker, but by a lottery.

8.7 Works well for whom: Justice and Fairness in Society

The 'fairness principle' proposed by Zajac (1995) that 'equals be treated equally and unequals unequally in proportion to relevant similarities and differences'. Converting this into statistical terms means accepting as equivalent anyone whose score is 'not significantly different' from another score. This 'other score' could be a fixed threshold, as with the 11+ test, or it could be the highest score found in an entry test. There remains a question of judgement which level of certainty should be applied. Conventionally 95% or 99% values are used—that unless you can be 95% certain that the score is *less* than X, then it must be accepted that they are 'not significantly different'.

Taking the standard statistical approach may produce very wide acceptance bands—in other words, the statistical approach, because of its stringency, may give virtually everyone 'the benefit of the doubt'. It may be more practical, and make the acceptance of random selection easier if narrower bands were to be used. In an earlier paper (Boyle, 1998) I tried to operationalise this definition, using the old 11+ IQ test as the basis. A standard procedure divided the population into two groups, pass—25% and fail—75%, based on a cut-off score of 110, (IQ scores on a Normal Distributional Mean 100, SD 15). Instead I suggested three groups:

– automatic pass—the top 5%, because they had a very high probability (90%+) of all scoring at least 110, the cut-off value,
– fail—the bottom 55%, because they had were probably (<75%+) all less than 110, and
– a border zone of the middle 40%, above and below the cut-off value.

It was this 'border zone' which constituted the 'relevantly like cases', and which I proposed should therefore be subject to a graduated lottery.

In a comment on my paper, Barbara Goodwin in her 2005 book, *Justice by Lottery* comments:(p249) 'I suggest that the logic of Boyle's arguments should entail a lottery for *all* the candidates for a job, or in an examination, even when they appear to be 'significantly different' in terms of their score. The adverse personal circumstances and possible examiners' errors (e.g. mis-transcribing marks) which affect border-zone candidates could apply equally to those below the border zone. The objective of preventing demotivation and disillusion among the less able candidates would be achieved if *all* candidates were given at least some tickets for the graduated lottery (however few tickets). Boyle's assertion that it is salutary for borderline candidates to be aware of the chance-dependent nature of any selection process could equally be extended to those with the least chance of success. In all these respects, the border-zone candidates and those below the border zone are *not significantly different* even though their actual scores were significantly different.' She continues later:(p250) 'One objection to Boyle's proposal, then, is that it does not go far enough. Logically, it should extend to all the candidates in the competition below the cut-off point and, arguably, to those above it.' This may be a valid point, but might be impractical. It comes dangerously close to the modish idea of suggesting that there are no failures only 'deferred successes'.(Press Association, 2005).

A more systematic approach to deciding the border zone comes from Dodge & Romig who developed the theory of industrial sampling inspection for incoming batches (reviewed by Barnard, 2004). They introduced the concept of 'Producer's Risk' and 'Consumer's Risk'. In such a contractual situation it was easy to decide that

these risks should be the same for both parties: That the Producer's risk of having a good batch rejected should be the same as the Consumer's risk of having a bad batch accepted. ('Good' means within acceptable quality level, agreed in advance. These risks are labelled Type I and Type II errors respectively). As a matter of Justice between the parties in educational selection, it could be argued that the same equality of risks should apply.

Earlier in Chapter 5 I quoted Duxbury (1999) on the uses of randomisation in the selection of personnel for employment. He reviewed the experience of Northern Ireland which positively encouraged the use of a lottery to reduce the number of applicants to a manageable size. This advice had been tested in the courts and found acceptable. But Duxbury went further: 'It is worth noting that when arguments in favour of randomized recruitment practices are advanced or accepted, it is almost invariably in relation to low-grade posts which require that employees possess no special skills. Rarely is it argued that shortlists should be determined randomly where there exists an excess of suitably qualified candidates for skilled or professional occupations.' This strikes me as profoundly *unjust*. If random sampling is acceptable for the lowest in society, it must, in fairness, apply equally to the highest. Divine (1976) argued this case in respect of academic appointments.

8.8 Works well overall: Stability, Accountability and Rotation

Stability: By definition, a random distribution means prizes are given away at below market price. The results of the draw are not what would arise from a purely market situation, so it is not Pareto-optimal. This is the economists' crucial *first* criterion for judging any form of allocation, 'the one and only uncontroversial normative argument in economic theory' according to Moulin (1995, p6). It comes as no surprise to find Pareto-optimality used as a criterion to judge allocations. A non-Paretian distribution is open to manipulation.

In the last section I quoted from Hyland & Zeckhauser (1979) who became interested in random distribution because the students at Harvard had found ways to bend the

lottery for housing in their favour. Prior to the draw some discovered that by falsely stating their *second* preference as their first, they had a better chance of at least achieving their second-best option. Once any draw has taken place, prize-winners have even more opportunity to pervert the intentions of the principals. Through trading they may swap their prize with other prize-winners, or they may sell it on. Roth (2002) describes this as 'unravelling', and it is clearly a consequence of the lack of Pareto optimality. In the case of the intern matching program described by Roth, both strategic behaviour and post-allocation trading were undesirable.

However in some random allocations, trading is permitted: In the case of the telephone numbers (Chapter 4), this was encouraged. Whether trading is allowed or not, there will always be pressure to engage in it. For Wimbledon tickets there are strict rules which limit the number of applications made, and forbid post-ballot trading. All of these are easy to circumvent, multiple applications under different names take place, and selling on at a premium frequently take place. It is not easy to police such behaviour.

The implication for stability—ensuring that the allocation does not unravel—which so taxes Roth (2002) and other designers of economic mechanisms, can often be dealt with through normal administrative tools. Pareto optimality, too, may be important to economists, but it is only a first, not the last requirement. In practical engineering terms, designs may be appropriate even if *potentially* prone to unravelling:

—there will always be friction in the system. This is the phenomenon of 'liking what you already have' or an 'endowment effect' (as explained by Huck et al, 2005). In Roth's intern allocation example, if doctor A doesn't like Chicago but got Seattle and doctor B preferred but got the opposite, they might be tempted to swap. But this has costs in time and effort, so may not be worthwhile. It is likely that once allocated Seattle, doctor A may begin to grow to like it; ditto with doctor B.

—many engineering mechanisms are designed to be stable only for conditions that are likely to be encountered (No need to earthquake-proof in Swansea). If a structure does show instability such as wobbling, then the first answer is to

add some form of stabilisation. Administrators of allocation processes can do the same, making them more stable so as to avoid unravelling. This can be done by making it costly or awkward to swap post-allocation, or to make information about potential swaps difficult to discover.

Accountability and Trust: If random allocation is to be trusted, then it is vital that the mechanics of the process be independently verified. Many current examples are deficient in this regard: The Green Card lottery is carried out by a program on a mysterious computer in a Federal building in Kentucky. The Dutch medical school entry lottery is entrusted to a lawyer who performs it in his office (so Professor Drenth tells me). In the event of any disagreement, a lottery leaves no audit trail to follow. If the draw had been rigged then this would be difficult to disprove. What is needed is that at the very least the detailed results of the lottery be published so that statisticians could test its reliability. Conducting the draw in public, using physical randomisation devices adds to the credibility. The US Military Draft famously used the 'gold-fish bowl' when conducting a public draw. The published results formed the basis of several academic papers (Fienberg, 1971) proving that no bias had occurred.

A public drawing can also be an opportunity. Edgeworth (1890) suggested that randomised degree classifications at Cambridge be decided by 'a solemn conclave of the Fellows' convened at a dignified location for the purpose. In San Marino, drawing lots to decide the Capitani Regenti for the following year is carried out in the Basilica during High Mass. (Aubert, 1959). Adding an element of ceremonial to the draw adds dignity, creates a bonding experience and indeed should be an enjoyable experience.

Add rotation? Although not intrinsic to my hypothesis, where possible, adding rotation to random allocation has its attractions. Some prizes are indivisible and cannot be rotated. A place at medical school cannot be handed over half-way through the course. But rotation is sometimes not just possible, but desirable: The fishermen's *padu* is a rotating lottery. If it had been a one-off final settlement, it would have been far less acceptable, unstable, subject to attack by the losers. Many jobs can be held for a fixed period, just as short-term contract workers are

currently employed. This could be made more widespread, with re-entry through a random allocation process highly likely and fewer job-security worries. This would reflect the standard Athenian practice (Headlam, 1891) of all lottery-chosen posts being held for one year only, without renewal. There are advantages in job rotation: It helps job-holders to avoid becoming captive to the producer interest, which is a particular problem in the public sector; it may prevent employees getting stuck in their ways or becoming corrupt. Against rotation is the obvious insider-outsider distinction, that existing employees build up specific skills valuable to their employers, which would be lost through rotation.

8.9 Conclusions

The *efficiency* case for the use of random distribution for at least part of an allocation process looks like this to those involved:

– For the organisations there are relatively small but significant benefits in cost reduction, and control of illegal behaviour by their agents such as corruption and discrimination. This is unlikely to make them strong advocates of randomisation.

– Agents stand to lose out. On top of the insult to their imagined powers of selection, is the downgrading and maybe elimination of their 'important' positions.

– Collectively the recipients have most to gain. Their huge expenditure of effort in rent-seeking and signalling could be directed to more rewarding activity. But individually they are locked in a competitive situation, so a breakout is difficult.

– For society the benefits of reclaiming this wasted effort should be worthwhile, but many of the rent-seeking activities serve another purpose—social control. Keeping young peoples' noses in textbooks keeps them off the streets. Locking individuals into a competitive struggle with each other similarly keeps them out of other kinds of mischief.

Taken as a whole, the efficiency case for the use of random distribution is valid but not overwhelming.

The *reciprocity and inter-personal comparison* case for random distribution can best be deduced from the examples presented earlier. From experimental economics we know that these feelings are valued. Random distribution supports and demonstrates these higher human values, and by so doing improve people's lot.

For *Justice and Fairness* to prevail there has to be a positive need for them. Because Random Distribution is by its essence a 'fair' procedure then it is fairness manifest. Not only is it fair, but in the drawing ceremony it can be seen to be fair and hence just.

Chapter 9: Where Next to Cast Lots:

9.1 Developing the case for random allocation

Up to this point a descriptive case has been made for the use of randomisation as part of a distribution process. To go further in conventional economics would require the development of a theoretical framework, which will be outlined in the next section. More promising might be to take an applied approach, researching existing non-market mechanisms which make use of random distribution. I suggest three promising fields where some hands-on research could yield results which add to the economic understanding of non-market distribution using randomness, namely: The widespread practice in US universities of allocating student residences by lottery; developing the Dutch medical-school entry model in the UK context. It would also be highly condign to examine the use of random selection in employment and labour relations, examining equal opportunity effects. I conclude with a statement which summarises the benefits of random distribution, and could be used as the basis for advocacy.

9.2 Develop a standard economic model

The inclusion of a number of case studies has been important in establishing credibility, but a more rigorous case needs to be made. In the allocations being

described here there are two main parties: Suppliers and Consumers. Both should have a functional relationship which they wish to optimise:

The *Supplier's function* will firstly relate to *costs.* In developing economic models for suppliers, it would be useful to establish, using field research, what are the cost structures and relative burdens of existing allocation mechanisms:

—for example: in social housing allocation, either local councils or housing associations, there will be fixed costs associated with setting up features like the waiting list points system, plus variable costs per applicant. In addition, to ensure compliance with legislation, monitoring costs may be incurred. To what extent all of these are a significant burden, and what could be saved if an alternative system such as random allocation were adopted needs to be investigated.

The *Consumer's function* is normally quite simple—acting out of self-interest, the consumer wishes to maximise his satisfaction from consumption. But, learning from the cases of random allocation studied, I am convinced that simple self-interest is insufficient to fully encompass the full range of consumers' motivations in non-market allocation situations; that there is an inherent social, interpersonal dimension involved. An example of this was in the fishermen's *padu*, a community-based redistribution. There are also the higher virtues of justice and fairness, which I concluded came into play in such widespread distributions like the US Green Card lottery. If a model for all of this were sought it would have three independent variable axes along the lines of

q - relating to quantity consumed, the self-interest component

r - welfare related to inter-personal feelings, especially in communities

v - how feelings of virtues like fairness and justice add to wellbeing

Moulin (1995) in his 'Cooperative Microeconomics' has gone some way towards describing a game theoretic approach which combines **q** and **r** (satisfying greed and avoiding envy, as Moulin might describe it). This has only been applied to a narrow range of special situations. The third category **v** is much discussed by philosophers, and touched on in economics. Combining all three attributes in a

consumer's function, and developing meaningful conclusions from such models is a complex, and perhaps impossible task, which I do not intend to attempt.

An alternative to algebraic modelling might be to make use of experimental methods. This would certainly allow the focus to fall narrowly on the core issue—the use of randomness to decide who gets the prize. Any experiment requires careful formulation.

9.2 US university housing lotteries

In the US, using a lottery (random distribution) as part of the mechanism to allocate housing to students is widespread. Economists have long been aware of this, and some have even used this phenomenon as a basis for analysis of other things. None, however has investigated the use of lottery as such (apart from the example of Boyce (1994) whose primary interest was environmental economics). An investigation which directly asks why US universities choose to allocate housing randomly, and whether the customers—the students—are happy with this mechanism—seems long overdue.

In widespread use? In order to find out more about the use of the lottery in allocating students to housing at American universities, I ran a Google search (18th March 2004) on 'university housing lottery'. This produced 130,000 results which had all three words. On the first three pages I found examples of lottery-based student housing allocation at universities such as:

> Stanford, Pacific-Oregon, Rowan-NewJersey, Clark-Massachusets, Southeast-Missouri, West Florida, Quincy-Illinois, Butler, Scranton, Furman, Brown, Dennison, Connecticut, New Hampshire, Actors New School NY, Binghampton, De Pauw, Dayton, John Hopkins, Wesleyan-Illinois, San Jose, Harvard, Tufts. (all of these are in the U.S.A.)

From this it seems clear that using a lottery to allocate student housing is very widely used in American universities. A similar search restricted to Canada found a few examples (Guelph-Humber, Queen's Ontario, Victoria), but only after extensive searching. Neither Australia nor the U.K. produced any results. So the use of a lottery

in student housing allocations, it seems, is largely confined to North America, especially the United States. The description 'lottery' is generally used, although some instances of 'random selection' can be found, for example at Vanderbilt.

Economists aware of it? Examples of universities which use a lottery as part of their student housing allocation procedure are mentioned (in a footnote) in a paper by Abdulkadiroglu and Sonmez (1998) (A&S). They identify: graduate housing in Stanford University, University of Michigan, and University of Rochester; undergraduate housing at Carnegie Mellon University were allocated by a lottery mechanism. In an earlier paper, Hylland and Zeckhauser (1979)(H&Z) were especially interested in this procedure, because of its introduction in their own university—Harvard. They describe in some detail, again in a footnote, the introduction of a housing allocation lottery for students in the 1970's. Sacerdote (2001) drew on the lottery allocation at his own university, Dartmouth, to examine the effect of peer pressure.

Why don't the universities charge market rents? It may be that the universities persist in their use of lottery-allocation through inertia, ignoring the revenue-enhancing potential of a more market-based approach. However, it seems most improbable that so many universities would persist in charging below market rentals, without good cause. There is doubtless pressure to increase revenue from all activities at U.S. universities as elsewhere: Higher rentals could be used to equate supply and demand for student housing, generate more profit, as well as avoiding complex (and resented?) allocation procedures.

I have no direct evidence from US universities or their administrators, but it could be speculated that universities adopt a sub-market rent strategy because:

– universities compete for students. Housing becomes a 'loss-leader'.
– excess demand means that entry can be better controlled, and undesirables expelled.
– a belief that part of the costs of a merit good like university education should be subsidised.
– students are part of the community of the university, which includes the faculty staff as well as the alumni. Being subsidised as an undergraduate creates a

moral obligation to contribute later in life, that there is an implicit inter-generational contract.

Once a sub-market rent strategy has been adopted, then some means of coping with the inevitable excess demand has to be found. Why use a lottery as part of the process? Again I don't know, but speculate that:

– administrative convenience. A lottery is quicker and cheaper to run than some rule-based merit system.
– it avoids any taint of discrimination, which could be extremely damaging to the reputation of the university.
– University may aim to mix up students from different faculties, to achieve better socialisation, and awareness by students of other parts of the institution
– it is an enjoyable bonding experience shared by many students.

But what of the students? Are they just optimising customers of the university housing allocation system? Economists make the assumption, so strongly endorsed by Moulin, that Pareto-optimality is the one desirable characteristic of lottery or indeed any other system of university housing allocation. None makes any attempt to show that students wish to be treated solely as customers of a hotel-like operation, although this is probably a reasonable first assumption. Students, too, will act like hotel customers, wishing to be allocated the best room, with the nicest view. So the Pareto-optimising assumption of the previous section still holds. But there are other factors, peculiar to university room allocation:

– Inter-personal comparisons are inevitable and widespread. Students are sociable beings and will have plenty of opportunity to compare. Since room rentals are the usually the same for all properties, this sharpens the incentive to compare. Students, being more idealistic than the population at large (?) are more aware of situations that they perceive as unfair.
– Who is my neighbour? can be as important as the quality of the room allocated. It could be speculated that gloomy rooms would be most desirable if the 'leader of the pack' is already installed in one. Post-allocation swapping is generally allowed, and may have much more to do with being near friends, than achieving a better room.

– In a desire to become a member of the club of the university community, a communal ceremony like a room allocation lottery could be most attractive (mirroring the university's desire to engage students as members of the university).

There is ample opportunity to pursue a research programme, based on these questions and speculations.

9.4 University entrance in the UK

It may seem pointless to return to the topic of university entrance mechanisms. After all, in the example in Chapter 3, I seem to have produced the perfect example of a system which (almost) perfectly combines an appropriate measure of merit with the truly egalitarian mechanism of a weighted lottery. It only remains for some champion to pursue a campaign of advocacy for such a sensible policy. Not so. The commission which reported on admission to English universities in (Schwartz, 2004a) toyed with the idea of random selection. It was reported in a Times headline (Sept 6, 2003) 'Universities to pick students by lottery'. This did not appear in the final report. Instead the recommendations stuck to minor tinkering with the existing system.

Such timidity in the face of likely opposition is understandable. Any proposal to pick students by lottery would be greeted with distaste by the students (as evidenced by the elicitation examples in Chapter 1). Extreme ire would be the likely response of the parents expected to fund these students. However good the mechanism used in the Netherlands, however much the students there seem to accept and even cherish it, however well Professor Drenth has scrutinised it and found it is good, random distribution of university places will not be adopted in England. The design flaw is acceptability, so perhaps it is time to go back to the concept of the design of economic mechanisms.

Roth's (2002) paper on 'The economist as engineer' alluded to the methods of engineering design, although he took that line of reasoning no further. I believe I can

contribute to the important field of design of economic mechanisms by introducing a recently developed technique from engineering design.

Affective Design (Kansei Engineering) in Japan is the title of a Department of Trade publication ca 2004, which gives a glossy version of this new development in engineering design. *Kansei design techniques* are described thus*:* 'Manufacturers have tried many routes to understanding consumer preferences so that they can incorporate them into their designs. In the competitive market place, it is increasingly important to look beyond the obvious and to seek more subtle indications of what product designs will be popular. When asked to describe their requirements from a product, consumers will frequently include a mixture of functional features and descriptions relating to how the design appeals to them on a more subjective emotional level (for example, must look fresh, be comforting, sound fast, must feel dependable). A methodology which is new in Europe but well established in the Far East is being investigated in a European 5th Framework project called Kensys. Kansei Engineering is a technique aimed at translating subjective requirements into product design features and thereby incorporating consumer emotion into the product design process. The Kansei method involves extensive examination of the market, discussions with designers, customer surveys and data analysis. Techniques such as factor analysis and statistical modelling are used to extract underlying traits and make predictions. Issues of selection of a representative product sample, sample size when sampling the customer base and decisions on categorising some independent variables need to be considered.' (This is a quotation from http://conference.iproms.org/node/161 Conference paper: 'Statistics supporting the design process via Kansei engineering' by S Coleman, K Pearce and C van Lottum, University of Newcastle upon Tyne.)

It may seem a large conceptual leap from the design of a new sports car which titillates jaded consumer desires to the serious matter of deciding the mechanism whereby someone gets the prize of a university place. Not so. It seems that it is the negative feelings which the use of a lottery seems to evoke which are the main obstacle to its acceptance. Hence the need to tackle the design of the economic mechanism from the standpoint of 'feelings and impressions'. What I would envisage is to engage with a group of local sixth-formers, who are the main target group for university entrance. With them I would explore the characteristics of different

admissions systems. The technique for the analysis of their responses already exists, and can be drawn on. This would be a highly innovative and speculative approach in economics, but it is already established in engineering design.

9.6 Employment: Randomised short-listing

Since it was the transition processes of employment—hiring, firing and promoting—which figured so prominently in my thesis, it is only right that I should follow up this theme. My proposal that these processes should include an element of randomness is both controversial, and unlikely to be adopted without further research, followed by considerable advocacy. What form such applied research might take is unclear, but I am impressed by the models given by Audas, Barmby & Treble in their 2004 'Luck, effort and reward in organisational hierarchy' in *Journal of Labor Economics*. Their methodology is based on a dataset of employees in a financial services organisation. Using this or a similar data set, it might be possible to infer some of the consequences when a random selection mechanism might be used.

In the troubled context of Northern Ireland using a randomisation process to produce short-lists has been used for some time. Explicit approval has been given by EOC (NI) in its Guidance Notes. It has also been subject to scrutiny. (Duxbury, 1999, p87). This presents an attractive research setting: One possibility is to use the elicitation method to test reactions of the 'victims' to the actual use of randomisation, and to explore its extended use. It could also be rewarding to discover the genesis of the idea: How did it arise? Who championed it? Who opposed it? How was the idea of using random selection finally adopted?

9.5 Advocacy: Selling the Idea of Random Distribution

Ideas, like toothpaste, do not sell themselves, they need to be promoted. To finish, I suggest how the idea of random distribution could be 'sold':

'Firstly, I am not advocating the use of random distribution in all cases, willy-nilly. When public assets are transferred to private firms, then the full market price should be extracted. So using a lottery to give away telephone numbers, airport landing slots or whitewater rafting permits merely allows private interests to capture the economic rent, and exploit their prize to further increase their wealth at the expense of society at large. Economists such as Binmore have shown how disposal of public assets can be arranged to ensure maximum public benefit. The private firms benefit too, because they are freed from the burden of seeking to capture economic rents. They can then concentrate on their welfare-enhancing function: Producing good-quality products in abundance at the lowest possible price.

Commercial organisations might consider the use of random distribution as part of their marketing strategy. There is a limited role for distribution of tickets to sporting or entertainment events using a lottery. This might be for image-enhancement—'we want to be fair to our loyal fans', or it might be as a more satisfactory alternative to rationing by queuing. A simple calculus of costs and benefits for the firm, and with some regard to customer benefit should reveal if rationing by price, by queuing or by a lottery produces the best result.

In the interests of justice and fairness the benefits and burdens of Society should be distributed equally among its members, a case made by Zelleke (2005). When these are non-divisible, then a simple lottery represents a fundamental democratic response. Hence the military draft, where all 19-year-old men were at equal risk of call-up; or jury service, where all electors are liable for service. The US Green Card lottery, gives almost every member of the human race an equal chance of becoming an American citizen. The use of a simple lottery embodies the principle, that if there cannot be actual equality, then at least there should be equality of chances.

At a more mundane level, random selection should appeal to cost-conscious firms. The process of random selection is quick and easy, so should cost less than the more elaborate procedures currently adopted. As I have tried to show, these procedures only weakly identify talent, so a lottery will certainly be no worse. Other benefits of random selection for the firm are that it should contain much of the corrupt or biased

behaviour by its own agents. This too, means that compliance with anti-discrimination legislation should be assured, relieving the firm of potential losses.

At a local level, simple random distribution can be the manifestation inter-personal values of reciprocity and consideration. In work groups which interact face-to-face, random distribution of earning opportunities or work stations together with regular rotation should enhance fellow-feeling. Human needs are more than just about self-interest. There is the need for fairplay, and regard for others in a social setting. The evidence that these needs are significant and should be addressed, not least by economists, is steadily accumulating. To encourage co-operation and improve the well-being of workers in groups, a neutral arbiter is needed. Since few if any humans possess such powers of detachment, recourse to the truly independent power of random chance is the best option.

There are advocates of Random Selection who see it as a cure for the democratic malaise: That reform of Government to make it more responsive to the needs of the people requires the replacement of voting with a form of jury service. Representatives could be chosen at random to fill the roles of MPs (Sutherland, 2004) or to become Lords (Barnett, 1998), are examples of this proposal. I do not disagree with these ideas, but am unsure how much significant change they would make for the lives of people. Corporate influence would still persist, and might find it easier to suborn the randomly selected representatives. Far more important to the lives of ordinary people is their ability to make their way in life.

We cannot choose to whom we are born, but after that we all hope to have the opportunity to advance. For most of us, it is jobs and education which determine what sort of lives we lead. The basis of the meritocratic ideal is that there should be fair, equal and open access to these. But, as I have tried to show, selection on merit has become a twisted charade. There is some evidence that simple indicators of merit, such as IQ give reasons to select some and reject others. The use of worthless interviews and the imposition of higher grades as gate-keeping devices distort the process. When other irrelevant indicators like hobbies are used in the name of

selection on merit, the process ensures that those who are already advantaged get priority—a phenomenon known as 'the sharp elbows of the middle class'.

This is, I believe, the real democratic prize. Certainly where evidence is established for necessary ability to undertake a job, or to have a chance of success on a particular course of education, then it should be used to reject those patently not qualified. This will invariably leave an excess of applicants over places, especially the popular courses and prestigious jobs. Random selection is the right thing to do next. Anything else is undemocratic, violates our basic belief in an opportunity society. It would be better if the selection lottery was weighted to represent the likely chances of success on the job or on a course. Given the fuzziness of the relationship between measured ability and performance, the form of weighting is a matter of debate. Equal weighting would be the egalitarian choice, favouring the top-scorers would appeal to elitists. The application of validated merit plus a lottery for the award of jobs should extend to hiring, firing and above all promotions. Because it changes the things that matter most in our lives, applying random selection to the most significant prizes in our lifetimes will do far more to achieve a truly democratic society than would reform of Parliament.'

'Let the dice, not frail and devious human judgement, decide my fate!'

Appendices

A How Merit evolved

B Measuring Happiness: An Example

Appendix A. How Merit Evolved

Contents:

Before 'merit' - traditional methods of selection

In the past those with power and possession were able to exercise both patronage and nepotism. Some elements of patronage persist to this day: The appointment of some incumbent vicars in the Church of England is in the gift of the local landowner. Appointing members of your extended family is a traditional way that immigrant communities thrive, safe in the knowledge that they should be able to trust their relatives. Of course the counterpart to this form of insider appointment is that the applicant must curry favour with those bestowing gifts.

Inheritance, particularly through primogeniture has been the basis for handing down kingships, titles and the landed estates that go with them. This was based on an instinctive belief in the hereditability of the exceptional talent. It was Francis Galton in his tract on 'Hereditable Genius' (1869) who invented the pseudo-science of Eugenics. By showing that the sons of Lord Chancellors of England were also high achievers seemed to support his case, but later scholars spotted the flaws in his argument.

Strict seniority, awarding the next job or promotion to the oldest eligible candidate has been used in institutions such as monasteries and amongst airline pilots. In the case of monasteries, appointments are based on time elapsed since ordination. For airline pilots, promotion to captain by length of service has a certain logic: All pilots must be competent to fly aeroplanes; regular testing ensures this. It would invidious to suggest that some were better than others, and hence more worthy of promotion. This would imply that the non-promoted, were somehow less competent, yet could still be trusted to take control.

Elections are widely used as part of the democratic process, and can sometimes be found in organisational allocation. Clubs, political parties, even orchestras *elect* their leaders (The Berlin Philharmonic is one example). Honda allowed the workers in a section to elect their section leader.

A major move towards 'merit'—Open competitive examinations

In a move away from the patronage-based appointment systems that went before, the British Civil Service and the Indian Office adopted a novel approach: Selection based solely on the results of examinations which were, in theory, open to anyone. This is Parkinson's (1958) (of 'Parkinson's Law' fame) delightful description of how the system arose:

'The Chinese system was studied by Europeans between 1815 and 1830 and adopted by the East India Company in 1832. The effectiveness of this method was investigated by a committee in 1854, with Macaulay as chairman. The result was that the system of competitive examination was introduced into the Civil Service in 1855. An essential feature of the Chinese examinations had been their literary character. The test was in a knowledge of the classics, in an ability to write elegantly (both prose and verse) and in the stamina necessary to complete the course. All these features were faithfully incorporated in the Trevelyan-Northcote Report, and thereafter in the system it did so much to create. It was assumed that classical learning and literary ability would fit any candidate for any administrative post. It was assumed (no doubt rightly) that a scientific education would fit a candidate for nothing— except, possibly, science. It was known, finally, that it is

virtually impossible to find an order of merit among people who have been examined in different subjects. Since it is impracticable to decide whether one man is better in geology than another man in physics, it is at least convenient to be able to rule them both out as useless. When all candidates alike have to write Greek or Latin verse, it is relatively easy to decide which verse is the best. Men thus selected on their classical performance were then sent forth to govern India. Those with lower marks were retained to govern England. Those with still lower marks were rejected altogether or sent to the colonies.'

Parkinson concludes that
'Selection by competitive examination was never therefore more than a moderate success.
but adds sardonically that
'Whatever the faults, however, of the competitive written examination, it certainly produced better results than any method that has been attempted since.'

Open competitive examinations are little used currently, but at least they make the point: That it is possible to allocate benefices based on some form of objective measured merit rather than the corrupt and wasteful systems that went before. The search was now on to find better, more rational methods of selection.

'The Rise of the Meritocracy' Michael Young's warning on IQ testing

Meritocracy is usually employed in the sense of a social system which allows people to achieve success proportionate to their talents and abilities, as opposed to one in which social class or wealth is the controlling factor. But the original coiner of the word meritocracy had a different idea—not an egalitarian utopia, but something far less attractive. As the twentieth century developed, and more advanced technologies were transforming the lives of ordinary people, it was reasonable to ask: What if the testing of people could become as predictable and accurate as say launching a Sputnik? This was the idea developed by Michael Young, who was a highly respected British sociologist. It was his 1958 satire, *The Rise of the Meritocracy 1870-2033*, which offered a prescient critique of how ever-more reliable IQ measurement would create a dangerously smug

ruling class and a demoralised lower class. The book, which was highly influential in its time, is a mixture of known facts, and intelligent speculation about the future.

In Young's famous formulation (p74)

M can be defined as M = I + E

where **I** is IQ—intelligence quotient, as measured by an IQ test, and **E** is Effort, as measured by 'scientific management'.

To make sure that no-one was in any doubt about the importance of IQ, Young listed what was known about IQ and performance (p157):' High scores on IQ tests was correlated with high performance at Grammar School, University and Life. It was also an indicator of many abilities: verbal, numerical, spatial, perceptual, memory, car-driving, digital dexterity, analogising power, mechanical aptitude, clerical aptitude, emotional maturity, sexual attraction, taste sensitivity, accuracy, persistency, powers of observation.'

Young imagined that the testing of IQ would become more precise, and that the abilities listed above would be closely correlated with performance. On the measurement of effort Young was less sure-footed: He referred to the well-known pioneer of scientific management, F W Taylor, whose name is associated with the time-and-motion study movement, which did much to improve the efficiency of both factories and offices.

As a consequence, the cleverer workers would be sorted out into the top jobs, where they would meet like-minded people, marry them and have a new generation of super-intelligent offspring. In this way a new aristocracy of merit would arise, which in time would declare itself permanent. It hardly need be added that Young's meritocratic dystopia has not happened. It is worth examining why:

IQ – intelligence quotient: Methods of measuring IQ have not improved in either accuracy or reliability. The basic tests developed by Binet and others earlier in the

twentieth century are as good as it gets. As with all measurements they are subject to error, which must cast the first doubts on Young's mechanism—mavericks would still slip through or be failed by the system of testing. Another mistake is to assume that if a strong correlation exists, then a fully determined relationship exists. Even the best predictions—for example 11+ test and GCE results at age 16—only explain about 70% of the variability; the remaining 30% comes from elsewhere. Even the last link in the chain—through 'assortive mating', that clever people would only mix and mate with each other, and hence selectively breed a new super-intelligent species, Young probably knew he was mistaken, but then he never claimed that his book was anything other than a satire. Assortive mating does take place, but instinctual biological drives will often result in a high-status male choosing a dim but attractive female. In any event the well-known phenomenon of 'regression towards the mean'—that cleverer couples tend to have less bright offspring, and similarly the dim tend to have less dim children, effectively destroys the eugenicists' fantasy.

Effort is clearly important, but measuring it is not scientific, only a matter of value-judgment. A more recent attempt to measure 'effort' came in a paper by economists in Audas, Barmby & Treble 'Luck, effort and reward' (2003). Effort was identified for a group of workers as lack of absences, plus good supervisor ratings.

How tests of ability work: Two examples

These are tests which have been widely used and which have also been subject to close scrutiny. It is also possible to identify the fudges—subjective adjustments—which have been made by officials in order to keep the tests useable and acceptable.

1. The 11+ :School selection using an intelligence test

(This section draws heavily on Vernon (1957), who reviewed the evidence for the effectiveness of the eleven-plus IQ test. A more recent publication by Gipps and Murphy (1994) covers some of the same ground but does not challenge any of the

earlier figures which were produced concerning the accuracy and reliability of this test.)(This is an extract from Boyle(1998))

The objective of the British eleven-plus test was to measure the IQ of all children in the 11-year-old cohort within each local education authority (LEA). This could involve tens of thousands of school-children in a single authority (borough), so there was plenty of scope to establish fair and efficient procedures. On the basis of their scores on the test, a percentage of the pupils from the cohort, which ranged from 14% in Nottinghamshire to 60% in Merionethshire, were allocated to grammar schools, in the belief that they could benefit from an academic style of education.
The measure of success for the eleven-plus test was very simple: how well did the test predict the performance of the cohort 5 years later at the General Certificate of Education (national, public) examinations? The short answer is very well indeed, especially compared with alternative methods of selection and prediction. These were:— conventional examinations in mathematics and English, ranking by teachers and special entrance examinations set by individual schools. A global figure for the reliability of IQ tests in predicting later examination scores was estimated by Vernon(1957) at a correlation coefficient of 0.70. All other methods showed lower correlations.

The implementation of the eleven-plus test varied from one LEA to another. It was appreciated that the test was not perfect, and that a sharp cut-off point would result in the unfairness of candidates being wrongly allocated. For this reason most LEAs adopted a 'border zone' procedure, calling for further reports on candidates who fell just below the cut-off point. As time went on this border zone shrank, mainly for practical reasons. What was needed, according to one shrewd local councillor, was a test which was 'technically sound, administratively feasible and politically defensible' (Vernon (1957), p. 30). The IQ test seemed to be sound. For administrative and political reasons the border zone was progressively shrunk.

A well-known feature of the 11+ test was that girls consistently outperformed boys. This early maturation of cognitive abilities in girls was normally reversed in later

schooldays. To allow for this, selectors imposed strict quotas, so that equal numbers of boys and girls would appear in the first year at grammar school.

The 11+ test has been subject to intense scrutiny, and most commentators have found a range of deficiencies.(for example Rose, Lewontin and Kamin, 1984) Their solution—abolish the 11+ and switch to a teacher-based assessment was carried through in the 1950s in South-West Hertfordshire (Gipps, 1994). The result was that fewer working class children were accepted at the Grammar schools, a result not quite in line with the hopes of social reformers.

The question of whether selection 'works' is still an open one—that is to say, if children are creamed off into one of the remaining Grammar schools would they perform better than expected had they gone to the local 'bog-standard' comprehensive. This theory has been tested by the National Audit Office (NAO, 2003). They admit that they cannot fully take into account all of the socio-economic factors which are so significant in modifying school performance: Yet based on research they commissioned they conclude that: 'as a group, selective schools (i.e. those still using the 11+) perform significantly better on average at Key Stage 3, but below average at GCSE level.' Faint praise indeed!

2. Scholastic Aptitude Tests (SAT) in the US

How SATs Work: SAT is the three-hour exam that measures a high school student's chance of academic success in the first year of college. Some colleges consider SAT scores major factors in their admission process, while others view high school academic performance, along with recommendations and extracurricular activities, equally, or even more, important.

The **SAT I** measures **verbal** and **math** reasoning abilities. The multiple-choice test, developed by the not-for-profit Educational Testing Service, is intended to let students demonstrate their verbal and math abilities without regard to the kind of schooling they've had. According to the College Board, the test looks for a student's ability to understand and analyse written material, to draw inferences, to differentiate

shades of meaning, to draw conclusions and solve math problems—all skills that are necessary for success in college and the work world.

SAT II: Subject Tests measure a student's knowledge of a particular subject, such as English (writing or literature), history and social sciences, mathematics (various levels), sciences, and languages (Chinese, French, German, modern Hebrew, Italian, Japanese, Latin, Spanish, English). Some colleges require one or more SAT II tests, but even if they aren't required, SAT II tests scores can help present a more personalized portfolio that illustrates how well you would fit at a particular school. Most colleges use SAT II scores not for admission purposes but for program placement and counselling. (from howstuffworks.com)

There is wide disquiet about the use of SATs as reported in the Guardian (2000) Consistent differences emerge between males who score higher, and females. Yet it is females who generally perform best on their university courses. There are large average differences between ethnic groups. Bob Schaeffer, a critic of the tests, runs the National Center for Fair and Open Testing (FairTest) considers that the top universities' habit of requiring high minimum SAT scores are flagrantly misusing the test scores.

To overcome the differing gender outcomes, it is the practice according to Gipps & Murphy (1994) to modify the questions to ensure equality of outcome between the sexes. This involves taking out questions where boys score well and adding in girl-friendly ones.

Personality testing:

Just like intelligence tests, tests are available to assess personality. It is more difficult to assess personality than it is to assess intelligence. Intelligence is an ability. It is not possible to score higher than your ability lets you. In measuring personality cheating can become a problem. It is less difficult to pretend you are different from the way you really are. There are two ways of assessing personality: by using projective tests and by using self report tests.

Projective tests

The picture on the right is an example of an item in a projective test. You can find it in the Rorschach inkblot test. The person tested will be asked what he sees when he looks at the picture. In other words, he is asked for his interpretation. The interpretation someone gives of an ambiguous picture like this is believed to provide relevant information about the personality of that person. For example, if you see two evil eyes that stare at you, that might mean that you have a somewhat paranoid personality. (Picture of the blot not included.)

Self report tests

Self reports test are completely different from projective tests. Let's take a look at a possible item of a self report test:

You have nothing to do this evening. You've been looking forward to relaxing, because you've worked very hard the last few days. At 20.00 PM the phone rings. You pick it up and you are invited by a friend to go out to the cinema. The movie begins at 20.30 PM. What would you do?

A You react very positively and leave right away
B You say you like the idea but don't feel like it right now
C You don't know what to do at first, but eventually you let your friend talk you into it

This situations may say something about just how introvert or extravert you are. You will understand that it is easy to see what this item measures. Therefore, it is also relatively easy to cheat.

(from www.psyonline.nl/en-presoon.htm)

An academic view of the topic can be found at:
http://pmc.psych.nwu.edu/personality.html

Appendix B. Measuring Happiness: An Example

MEASURING HAPPINESS: A pilot study

This Appendix serves two functions in relation to this thesis:

–it provides an example of a valid questionnaire which measures the abstract concept 'happiness'. Earlier, in chapter 1, the idea of elicitation using similar questionnaires was introduced, primarily to test if respondents thought that random allocation would be 'fair'. I criticised the methodology, especially in relation to identifying consumers feelings, so I include this example to show how it should be done.

–it provides some evidence (in chapter 3) for the 'rent-dissipation' involved in winning the prize of a university place.

Originally I had hoped to use measured happiness (Subjective Well-Being in the jargon) as a basis for identifying satisfaction with selection mechanisms for university students. Measuring 'happiness' would subsume all the motives of individual satisfaction, inter-personal comparison, and broader feelings of fairness and justice, without having to get involved in the messy business of what each contributed to overall happiness. To this end in September 2003 I conducted a pilot 'happiness survey' on first year (newly arrived) Economics students at University of Wales, Swansea. Full details of the questionnaire and the results are given later in this appendix.

The Questionnaire I used to measure 'happiness' was: GHQ-12 – General Household Questionnaire, which I obtained from the ESRC Archive Essex. This has been widely used, tested and validated, for example by Oswald at Warwick University. In addition I posed some factual questions which I hoped would correlate with measured happiness.

The results proved interesting, but also showed up the fundamental flaw as far as any proposed research of mine was concerned. Because measured happiness is so variable from one individual to another, it is difficult to make valid inferences between small groups. It is possible to detect small but significant differences when samples are very large: For example van Praag & Baarsma (2005) were able to use large-scale happiness surveys to establish reactions to airport noise. My sample of about 80 students was far

too small to establish comparisons with another group subject to a different admission procedure.

What follows is

– The Questionnaire as applied to 87 students (82 used, 5 unusable) present on Friday afternoon, 26th September 2003.
– A brief Report, summarising the conclusions from my analysis of their responses.
–The original data from the completed questionnaires

Feedback on the 'happiness' questionnaire:
(as posted to students who responded)

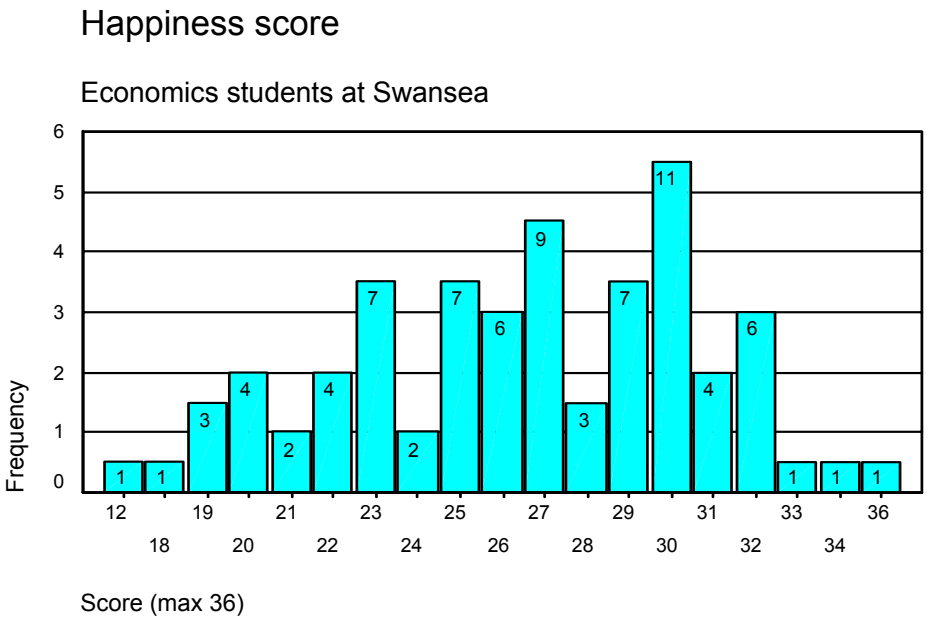
First year Economics students at Swansea 2003

Thanks for helping me with your responses, and answering so many strange questions so reliably, late in the afternoon on Monday, 29th September.

Your happiness scores based on the 12 questions: Overall you are a cheerful group, significantly happier than the population at large:

Economics students at Swansea:	Mean score	26.6 /36
Major survey of the population:	Mean score	25.0/36

Of course, individual scores varied quite a lot as shown by this histogram



Individual happiness questions also varied quite a bit
—the happiest response was for: 'do you think your worthless?' A: 'not at all'
and—the least happy: 'have you been able to concentrate?' A: 'better than usual'

There were three questions about the amount of extra effort you put in to get here:

1. **Repeat subjects to improve grades?** ¼ said yes, with 1,2 or 3 subjects repeated. The supplementary question on extra time spent on these repeated grades averages out at about 4 months per repeating student.

2. **Extra time for better grades?** ¼ said yes with an average of 2 hours per week spent by each student who spent the extra hours

3. **Time spent on the application process:** The median value was about 10 full days per student spent on form-filling, interviews.

My tentative conclusion about your 'Rent-seeking' *(the economists' term for effort spent trying to win a prize—effort which isn't useful in itself) Combining the three time-spending items and spreading the times over all students gives an average value of about* ***TWO months*** *spent over and above the basic requirement to be adequately qualified for entry.*

Am I on the right course and at the right university? 85% said 'yes' and 'yes'. Hope you still feel so positive at the end of the year!

Now for a bit of fancy Analysis: Can your Happiness score be explained in terms of any of the other factors identified?

Using a standard linear multivariate regression model where Y is the Happiness score, which is to be explained in terms of

Variable X	in units of	Regress coeff	t-value	Interpretation	as expected?
Age	in years	-1.188	1.34	older->glummer	?
Sex	M=1 F=2	-2.32	1.85	M happier than F	?
UCAS tariff	actual score/100	-0.825	.57	More pts->glummer	×
Repeat subjects	N=0 Y=1	0.905	.47	repeat = happier ☺	×
Extra study time	N=0 Y=1	-0.577	.32	spend extra time->glum	√
Days on applic	days	-0.007	.68	more days-> glum	√
Right course	1=yy 2=yn 3=nn	-0.340	.25	wrong-er -> glum	√

BUT—none of these factors gives much of an explanation, a result which is shows up on the Index of Determination of just 3.3%. So the reasons why you are more or less happy than others in your group is due far more due to your own personality, and not whether you are a bit older than the rest, or scored fewer UCAS points, or spent an extra year repeating subjects.

Many thanks for your help.

Conall Boyle

Comments or questions to 301380@swansea.ac.uk

RAW DATA FROM THE COMPLETED QUESTIONNAIRES:

(on the following two pages)

Rec No	1.1	1.1	1.2	1.3	2.1	2.1Y	2.1Y	2.2	2.2Y	2.3	2.4	3.1	4a	4b	4c	4d	4e	4f	4g	4h	4i	4j	4k	4l
	age	sex	Crs	UCAS pts	RsubjYN	Nxtrasubj	xtime	xTimegrad	hrs/week	time-app	pay £	crsOK	conc	sleep	useful	decision	strain	difficulty	enjoy	problem	unhappy	conf	workless	allhappy
1	18	2		230	1	2	3	0		10	0	1	2	1	1	2	2	2	2	2	2	2	2	2
2	18	2		280	0			0		20	0	1	2	3	2	1	3	3	2	1	2	2	1	2
3	18	2		0	0			0		10	0	1	2	2	3	2	2	2	3	2	3	2	2	2
4	18	2		280	0			0		14	0	1	3	3	2	2	3	3	2	2	3	2	2	2
5	19	1		240	0			0		10	0	1	2	1	1	2	2	4	1	2	1	1	1	1
6	19	1		ABE	0			0		10	0	1	2	1	1	1	2	1	2	2	1	1	1	2
7	19	1		BCC	0			0		3	0	3	3	3	2	3	2	3	1	2	3	2	2	3
8	19	1		280	1	3	0	1	4	30	0	1	2	1	2	1	3	2	2	1	3	3	1	2
9	19	1		280	0			0		20	0	1	2	1	2	3	2	1	2	2	1	2	1	2
10	18	2		200	0			0		10	0	2	2	2	2	2	3	2	3	2	2	2	2	2
11	19	2		260	1	2	0	1	2	10	0	1	4	3	2	2	3	2	2	2	2	2	2	2
12	18	1		220	0			0		7	0	1	1	1	1	1	2	2	1	2	2	1	1	1
13	17	2		0	0			0		2	0	2												
14	18	1		240	0			0		2	0	1	2	1	2	2	1	1	2	1	1	1	1	1
15	18	2		260	0			0		3	0	1	2	1	2	2	2	1	2	2	1	1	1	2
16	20	2		280	1	1	12	1	10	14	0	1	2	1	2	2	1	1	2	2	1	1	1	2
17	19	2		0	0			0			0	2	3	2	3	2	3	2	3	2	2	1	1	3
18	18	1		220	0			0			0	1	1	1	2	2	2	1	1	2	1	2	1	1
19	18	2		200	1	3		1	30	20	0	1	2	1	2	3	2	1	2	2	2	1	1	1
20	18	1		240	0			0			0	1	2	2	2	2	1	2	3	2	1	2	1	2
21	18	1		280	0			1	5	10	0	1	2	2	2	2	2	1	2	2	2	1	1	2
22	18	1		280	0			0		5	0	1	2	1	2	2	3	3	1	2	2	2	1	1
23	20	2		0	0			0		30	0	2	1	2	1	2	2	1	1	1	2	1	1	2
24	23	1		0	0			0		14	0	1	2	2	2	2	1	3	3	1	1	1	1	2
25	19	1		0	0			0		50	0	1	1	1	1	1	1	1	1	1	1	1	1	1
26	19	1		0	1	1	4	0		8	0	1	2	2	1	1	2	2	1	2	1	1	1	2
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28	19	1		0	1	2	1	1	8	3	0	1	2	2	2	1	2	2	1	2	1	1	1	1
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32	18	2		280	0			0		4	0	1	2	2	2	1	1	1	2	2	1	2	1	1
33	19	2		280	1	2	12	1	7	14	0	1	2	1	1	1	2	1	1	2	1	1	1	2
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37	19	1		220	0			0		100	0	1	2	1	2	1	2	2	2	1	2	2	2	2
38	18	1		280	1	2	0	1	3	115	0	1	2	1	2	3	3	2	3	2	1	1	1	2
39	18	1		bacc	0			0		10	0	1	2	2	1	3	1	2	2	3	3	2	1	1
40	18	1		280	0			0		365	0	1	1	1	2	2	3	2	2	2	2	2	2	2
41	18	2		260	0			0		-1	0	1	2	1	2	1	2	1	2	3	1	1	1	1
42	21	2		hnd	0			0		7	0	1	2	1	2	2	1	1	3	2	1	2	3	2
43	18	2		300	0			0		10	0	1	2	2	2	2	2	1	1	2	2	2	1	2
44	19	2		china	0			1	7	7	0	1	1	2	2	2	1	1	1	1	1	1	1	1
45	19	1		240	0			0		3	0	2	2	2	2	2	2	1	3	2	1	3	1	1
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48	19	1		240	0			0		30	0	2	2	1	2	1	3	1	2	2	2	1	2	2
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58	18	1		0	1	1	0	0		5	0	1	2	1	2	2	2	2	3	1	1	1	1	1
59	18	1		240	0			0		5	0	1	2	2	2	2	2	2	2	2	2	2	1	1
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62	19	2		bbb	0			0		3	0	1	2	2	3	2	1	1	2	2	1	1	1	1
63	18	1		280	0			0		5	0	1	2	2	2	2	3	2	1	2	2	2	3	1
64	19	1		280	0			0		2	0	1	1	1	1	1	2	1	4	2	2	1	1	1
65	18	1		280	0			0		100	0	1	1	3	4	2	4	2	1	1	3	1	1	2
66	19	1		0	1	2	4	0		5	0	3	1	1	2	2	2	1	2	2	1	1	1	2
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71	18	1		260	0			0		3	0	1	2	1	2	2	1	2	2	2	1	1	1	2
72	18	2		280	0			0		3	0	1	2	1	1	1	1	1	1	2	1	1	1	1
73	19	1		220	0			0		4	0	1	2	1	2	2	1	1	2	2	1	1	1	2
74	18	1		240	0			0		4	0	2	2	1	2	2	2	2	3	2	1	1	1	2
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83	18										0	1												
84	18										0	1												
85	18										0	1												
86	18										0	1												
87	18										0	1												
88																								

References

Abdulkadiroglu, Atila and Sonmez, Tayfun (1998). 'Notes and Comments: Random serial dictatorship and the core from random endowments in house allocation problems', *Econometrica,* vol. 66(3), pp. 689–701.

Abramson, Jeffrey (1994). *We, the Jury: The Jury System and the Ideal of Democracy,* New York: Harper Collins.

Anand, Paul (2001). 'Procedural fairness in economic and social choice: Evidence from a survey of voters', *Journal of Economic Psychology,* vol. 22, pp. 247–270.

Angrist, Joshua (1990). 'Lifetime Earnings and the Vietnam Era Draft Lottery: Evidence from Social Security Administrative Records', *The American Economic Review*, vol. 80(3), pp. 313–336.

Astin, Alexander W. (1985). *Achieving educational excellence: A critical assessment of the priorities and practices in higher education,* San Franscisco: Josey-Bass.

Aubert, Vilhelm (1959). 'Chance in social affairs', *Inquiry,* vol. 2(1), pp. 1–24.

Audas, Rick, Barmby, Tim and Treble, John (2004). 'Luck, effort and reward in organisational hierarchy', *Journal of Labor Economics* vol. 22(2), pp. 379–395.

Balinski, Michel and Sönmez, Tayfun (1999). 'A Tale of Two Mechanisms: Student Placement', *Journal of Economic Theory,* vol. 84, pp. 73–94.

Bancroft, Lord (1995). 'An ethos up for sale', *The Guardian,* 20 Dec.

Barnard, George (2004). 'Business and industrial statistics: the early years', *Significance* vol. 1(3), pp. 106–108.

Barrett, Alan (1996). 'The green-card lottery winners: are they more or less skilled than other immigrants', *Economics Letters,* vol. 52, pp. 331–335.

Barnett, Anthony and Carty, Peter (1998). *The Athenian option: radical reform for the House of Lords,* London: Demos.

Baumol, William J. (1986). *Superfairness: Applications and Theory,* Cambridge, Mass: M. I. T. Press.

Bekhradnia, Bahram (2002). *Who does best at university*? Bristol and London: HEFCE – Higher Education Funding Council for England.

Bekhradnia, Bahram (2003).*Widening Participation and Fair Access: An Overview of the Evidence,* Oxford: HEPI –Higher Education Policy Institute.

Benz, Matthias and Stutzer, Alois (2002). 'Do workers enjoy procedural utility?', Working paper 127, *Institute for Empirical Research in Economics, University of Zurich.*

Bertrand, Marianne and Mullainathan, Sendil (2003). 'Are CEOs rewarded for luck? The ones without principals are'. Selected paper 86, *University of Chicago Graduate school of business.*

Beynon, Huw and Austrin, Terry (1994). *Masters and servants: Class and patronage in the making of a Labour organisation: The Durham miners and the English political tradition,* London: Rivers Oram Press.

Binmore, Ken and Klemper, Paul (2002). 'The biggest auction ever: The sale of British 3G telecom licences' *The Economic Journal,* vol. 112**,** pp. C72–C96.

Bohanon, Cecil E. and Coelho, Philip R. P. (1998). **'**The Costs of Free Land: The Oklahoma Land Rushes', *Journal of Real Estate Finance and Economics,* vol. 16(2), pp. 205–221.

Borger, Julian (1995). 'Luck of the draw decides sell-off bosses', *The Guardian,* 7 Jan p37.

Boyce, John R. (1994). 'Allocation of goods by lottery', *Economic Inquiry,* vol. XXXII (July), pp. 457–476.

Boyle, Conall (1984). 'An expert system for valuation of residential properties', *Journal of Valuation,* vol. 2**(**3), pp. 271–286.

Boyle, Conall (1998). 'Organizations selecting people: how the process could be made fairer by the appropriate use of lotteries', *The Statistician,* vol. 47(2), pp. 291–321.

Brams, Steven J. and Taylor, Alan D (1996). *Fair division: from cake cutting to dispute resolution,* Cambridge, University Press.

Broome, John (1984a). 'Uncertainty and fairness', *The Economic Journal,* vol. 94 pp. 624–632.

Broome, John (1984b). 'Selecting people randomly', *Ethics,* Oct, pp. 38-55.

Broome, John (1990). 'Fairness', *The Aristotelian Society,* meeting 3 Dec.

Broome, John (1994). 'Fairness versus Doing the most Good', *Hastings Center Report* July-August, pp. 36–39.

Buchanan, James M. (2003). *What is Public Choice Theory?* lecture 2 Feb, Michigan: Hillsdale College (http://www.hillsdale.edu/imprimis/2003/march/default.htm)

Buksazr, E. and Knetsch, J. (1994). 'Fragile redistribution choices behind a veil of ignorance', *Journal of Risk and Uncertainty,* vol. 14(1), pp. 63–74.

Burnheim, John (1985). *Is democracy possible? The alternative to electoral politics,* Cambridge: Polity Press.

Butler, Eamonn (1985). *Milton Friedman: a guide to his economic thought,* London: Gower.

Calabresi, Guido and Bobbitt, Philip (1978). *Tragic choices,* New York: Norton.

Camerer, Colin (1995) pp. 611-2, in **Kagel, John H. and Roth Alvin E. eds** (1995). *The handbook of experimental economics,* Princeton: University Press.

Cheshire, Paul and Sheppard, Stephen (2004). **'**Capitalising the Value of Free Schools: the impact of supply characteristics and uncertainty', *The Economic Journal,* vol. 114, F397–F424.

Chouinard, Hayley and Jonathan Yoder (2004). 'The Political Economy of River Rats and Idaho's Four Rivers Whitewater Rafting Lottery', *Western Economics Forum,* vol. III (1), pp. 17–26.

Clark, Andrew E. and Oswald, Andrew J. (2002). 'A simple statistical method for measuring how life events affect happiness', *International Journal of Epidemiology*, vol. 31 (6), 31, pp.1139-1144.

Cook, Mark (2003). *Personnel selection: adding value through people,* London: Wiley**.**

Cullen, Julie Berry; Jacob, Brian A. and Levitt, Steven (2003). 'The effect of school choice on student outcomes: Evidence from randomized lotteries', *NBER Working Paper* 10113 (www.nber.org/papers/w10113)

Daunton, M. J. (1981). 'Down the pit: Work in the Great Northern and South Wales coalfields, 1870-1914', *The Economic History Review,* vol. 34 (4), pp. 578–597.

Dawson, P. M. and Dobson, S. (2002). 'Managerial Efficiency and Human Capital: An Application to English Association Football', *Managerial and Decision Economics,* vol. 23, pp. 471-486.

Divine, Thomas M. (1976). 'Women in the Academy: Sex Discrimination in University Faculty Hiring and Promotion', *Journal of Law and Education,* vol. 5, pp. 429–51.

Dobson, Stephan and Goddard, John (2001). *The economics of football,* Cambridge: University Press.

Drenth, P. J. D. (1999). *The selection of medical students in the Netherlands—Reconciling the incompatibles,* Commission on the Points System Research Paper No 3, Dublin: Department of Education.

D T I (Department of Trade and Industry (ca 2004). *Affective Design (Kansei Engineering) in Japan (*www.faradaypackaging.com/docs/AffectiveDesignReport.pdf)

Duxbury, Neil (1999). *Random justice: On lotteries and legal decision-making,* Oxford: Clarendon Press.

Dworkin, Ronald (2000). *Sovereign virtue: The Theory and practice of equality,* Harvard: University Press.

Economist, The (1995). 'Heightism: short guys finish last', 23 Dec.

Economist, The (1999). 'Fat is a financial issue', 25 Nov.

Economist, The (2002a). 'Walk tall: Height and earnings', 25 Apr.

Economist, The (2002b). 'Changing fashions in chief executives', 5 Sep.

Economist, The (2002c). Leader: 'Immigration: Opening the door', 31 Oct.

Economist, The (2003). Leader: 'The right to be beautiful', 24 May.

Economist, The (2005a). Lexington: 'In praise of aptitude tests: What the much maligned SATs have done for America', 12 Mar.

Economist, The (2005b). 'Sex changes: Women and work', 4 Jun.

Edgeworth, F. Y. (1888). 'The statistics of examinations', *Journal of the Royal Statistical Society,* vol. 51, pp. 599–635.

Edgeworth, F. Y. (1890). 'The element of chance in competitive examinations', *Journal of the Royal Statistical Society,* vol. 53**,** pp. 644–663.

Elster, Jon (1987). 'Taming chance: Randomization in individual and social decisions', *Tanner lecture on Human Values,* Oxford: Brasenose College, 6, 7 May. (www.tannerlectures.utah.edu/lectures/Elster88.pdf)

Elster, Jon (1989). *Solomonic judgements: studies in the limitations of rationality,* Cambridge: University Press.

Elster, Jon (1992). *Local justice: how institutions allocate scarce goods and necessary burdens,* New York: Russell Sage.

Emery, Norman (1992). *The coalminers of Durham,* Stroud, Gloucestershire: Alan Sutton.

Estache, Antonio, Laffont, Jean-Jacques and Zhang, Xinzhu (2004). 'Downsizing with labor sharing and collusion', *Journal of Development Economics,* vol. 73, pp. 519–540.

Evans, Mary and Flores, Nicholas (2001). 'Relative economic efficiency and the provision of rationed goods', Working Paper 01–3, *Department of Economics,* Boulder: University of Colorado.

Eysenck, H. J. (1962). *Know your own I.Q.,* London: Penguin Books.

Fehr, Ernst and Schmidt, Klaus M. (1999). 'A theory of fairness, competition and co-operation', *Quarterly Journal of Economics,* August, pp. 817–868.

Fehr, Ernst and Schmidt, Klaus M. (2001). 'Theories of fairness and reciprocity: Evidence and economic application', Discussion paper 2001-2, *Department of Economics,* University of Munich. (http://epub.ub.uni-muenchen.de/archive/00000014/01/0102_fehr.pdf)

Fienberg, Stephen E. (1971). 'Randomization and Social Affairs: The 1970 Draft Lottery: Randomization is not easily achieved by the mixing of capsules in a bowl', *Science,* vol. 171(Jan), pp. 255–261.

Finlay, Robert (1980). *Politics in Renaissance Venice,* London: Ernest Benn.

Fix, P. and Loomis, J. (1998). 'Comparing the economic value of mountain biking estimated using revealed and stated preference', *Journal of Environmental Planning and Management,* vol. 41**(**2), pp. 227–236.

Fox, Jayston and Lusk, John A. (2003). 'Value elicitation in retail and laboratory environments', *Economics Letters*, vol. 79(1), pp. 27–34.

Frank, Robert H. (2004). *What price the moral high ground? Ethical dilemmas in competitive environments,* Princeton: University Press.

French, M. J. (1985). *Conceptual Design for Engineers,* London: Design Council, Springer.

French, Michael (2002). 'Physical appearance and earnings: further evidence', *Applied Economics,* vol. 34**,** pp. 569–572.

Frey, Bruno S. and Pommerehne, W. (1993). 'On the fairness of pricing—An empirical survey among the general population', *Journal of Economic Behavior and Organization,* vol. 20, pp. 295–307.

Friedman, Milton and Rose (1980). *Free to choose: a personal statement,* London: Penguin Books.

Fuller, Jon (2003). 'Playing the selection lottery: why Queen Mary has become the first college to choose medical students at random', *The Sunday Times,* 14 Sep.

Galbraith, John Kenneth (1987). *A history of economics: the past as the present,* London: Penguin Books.

Galton, Francis (1869). *Hereditary Genius: An inquiry into its laws and consequences,* London: Macmillan.

Ghiselli, Edwin G. (1966). *The validity of occupational aptitude tests,* New York: John Wiley.

Gipps, C. and Murphy, P. (1994). *A fair test? Assessment achievement and equity,* Buckingham: Open University Press.

Goodchild, Sophie and Jackson, Nick (2005). 'Looks count more than skills at work (and that goes for men too)', *Independent on Sunday,* 10 Apr.

Goodwin, Barbara (2005). *Justice by lottery 2e,* Exeter, Imprint Academic

Guardian, The (1995). 'Pates put bald men in a state', 29 Aug.

Guardian, The (2000). 'Sat score for uni-entry 'unfair'?', Education Guardian, 6 Jun.

Greely, Hank (1977). 'The equality of allocation by lot', *Harvard Civil Rights Civil Liberties Law Review,* vol. 12(1).

Greenwald, John (2001). 'Rank and Fire: Attrition isn't working, so best-to-worst grading is gaining—and those on the bottom get the boot', *Time,* 11 Jun.

G.S.S. – General Social Survey (1998). Q157 ...are you happy...? (www.icpsr.umich.edu:8080/GSS/rnd1998/merged/cdbk/happy.htm)

Hassink, Wolter and Koning, Pierre (2005). 'Do Financial Bonuses to Employees Reduce their Absenteeism? Outcome of a Lottery', Discussion Paper Series 05-27, Utrecht: School of Economics, (http://www.uu.nl/content/05-27.pdf).

Hazlett, Thomas W. and Michaels, Robert J. (1993). **'**The cost of rent-seeking: Evidence from cellular telephone license lotteries', *Southern Economic Journal,* Jan, pp. 425–35.

Headlam, James Wycliffe aka J W Headlam-Morley(1891). (revised by D C McGregor, 1933). *Election by lot at Athens,* Cambridge: University Press.

Herpin, Nicolas (2003). 'La taille des hommes: son incidence sur la vie en couple et la carrière professionelle', *Economie et Statistique,* vol. 361, pp. 71–90.

Hodgson, Geoff (1993). *Economics and evolution: Bringing back life into economics* Oxford: Polity Press.

Hodgson, Geoff (2002). 'Darwinism in economics: from analogy to ontology', *Journal of Evolutionary Economics,* vol. 12, pp. 259-281.

Hofstee, Willem K. B. (1990). 'Allocation by lot: a conceptual and empirical analysis', *Rationality and Society,* vol. 29(4), pp. 745–763.

Huang, Jen-Hung, Ching-Te Chang and Cathy Yi-Hsuan Chen (2005). **'**Perceived fairness of pricing on the Internet', *Journal of Economic Psychology,* vol. 26, pp. 343–361.

Huck, Steffen, Kirchsteiger, Georg and Oechssler, Jeorg (2005). 'Learning to like what you have—explaining the endowment effect', *The Economic Journal*, vol. 115 (July), pp. 689–702.

Hylland, Aanund and Zeckhauser, Richard (1979). 'The efficient allocation of individuals to positions', *The Journal of Political Economy*, vol. 87(2), (Apr), pp. 293–314.

Isonor v Department of Social Security (1994). Employment Appeal Tribunal EAT/965/93, (Transcript). 18 April.

Jeol, Doh-Shin and Laffont, Jean-Jacques (1999). 'The Efficient Mechanism for Downsizing the Public Sector', *The World Bank Economic Review,* vol. 13(1), pp. 67–88 .

Kahneman, Daniel (2002). *Maps of bounded rationality: A perspective on intuitive judgement and choice,* Nobel Prize Lecture, 8 Dec, Princeton University, Department of Psychology, Princeton, NJ 08544, USA.

Kahneman, Daniel (2003). 'A psychological perspective on economics', *American Economic Review,* vol. 93(2), pp. 162–168.

Kahneman, Daniel, Knetsch, Jack L. and Thaler, Richard (1986a). 'Fairness as a constraint on profit-seeking: Entitlements in the market', *American Economic Review,* vol. 76(4), pp. 728–741.

Kahneman, D., Knetsch J. L. and Thaler, R. H. (1986b). 'Fairness and the assumptions of economics', *Journal of Business,* vol. 59(4), S285–S300.

Kahneman, D, Knetsch, J. L. and Thaler, R. H. (1990). 'Experimental tests of the endowment effect and the Coase theorem', *Journal of Political Economy,* vol. 98(6), pp. 1325–1348.

Kahneman, D. and Tversky, A. (1979). 'Prospect theory: an analysis of decision under risk', *Econometrica,* vol. 47, pp. 263–291.

Kelman, E. G. and Canger, S. (1994). 'Validity of Interviews for Admissions Evaluation', *Journal of Veterinary Medical Education,* vol. 21(2).

Kerr, G. N. (1995). 'Managing congestion: Economics of price and lottery rationing' *Journal of Environmental Management,* vol. 45, pp. 347–364.

Khurana, Rakesh (2002). 'The curse of the superstar C.E.O.', *Harvard Business Review,* September, pp. 60–66.

King, Derek and Mossialos, Elias (1999). **'**Citizens and rationing: analysis of a European survey', *Health Policy,* vol. 49, pp. 75–135.

Kline, Paul (1991). *Intelligence: The psychometric view,* London: Routledge.

Konow, James (1996). 'A positive theory of economic fairness', *Journal of Economic Behavior & Organisation,* vol. 31 pp. 13–35.

Kremer, Michael (1997). 'Why are workers co-operatives so rare?', *NBER Working Paper* 6118.

Laffont, Jean-Jacques and Martimort, David (2002). *The theory of incentives: the principal–agent model,* Princeton: University Press.

Lane, Robert E. (1991). *The market experience,* Cambridge: University Press.

Layard, Richard (2003). *Happiness: Has Social Science a clue?* Lionel Robbins memorial lecture at LSE, 3,4,5 Mar: London (www.cep.lse.ac.uk/events/lectures)

Lazear, Edward P. (1995). *Personnel economics,* Cambridge Mass: M. I. T. Press.

le Grand, Julian (2003). *Motivation, agency, and public policy: Of Knights and Knaves, Pawns and Queens,* Oxford: University Press.

Leong, Frederick (2001). 'Birth order affects career interests', *Ohio State University Press Release* (http://researchnews.osu.edu/archive/birthwrk.htm.)

Leslie, Derek (2003). 'Using success to measure quality in British higher education: which subjects attract the best-qualified students?', *Journal of the Royal Statistical Society, A,* vol. 166(3), pp. 329–347.

Lobe, Kenton and Berkes, Firket (2004). 'A *padu* system of community-based fisheries management: change and local institutional innovation in South India', *Marine Policy,* vol. 28 pp. 271–278.

Lockard, Alan A. (2003). 'Decision by sortition: a means to reduce rent-seeking', *Public Choice,* vol. 116 (Sep)**,** pp. 435–451.

Loomis, John B. (1982). 'Effect of Non-price Rationing on Benefit Estimates from Publicly Provided Recreation', *Journal of Environmental Management,* vol. 14**,** pp. 283–289.

Lutz, Mark A. (1999). *Economics for the common good: Two centuries of social economic thought in the humanistic tradition,* New York: Routledge.

Maslow, Abraham (1987). *Motivation and Personality,* New York: Harper Rowe.

Molho, Ian (1997). *The economics of information: Lying and cheating in markets and organizations,* Oxford: Blackwell.

Moulin, Hervé (1995). *Cooperative microeconomics: A game theoretic introduction,* London: Harvester Wheatsheaf.

National Audit Office – N.A.O. (2001). *The Auction of Radio Spectrum for the Third Generation of Mobile Telephones,* London: Stationery Office (http://www.nao.org.uk/publications/nao_reports/01-02/0102233.pdf)

National Audit Office – N. A. O. (2003). *Making a difference: Performance of maintained secondary schools in England,* London: Stationery Office. (http://www.nao.gov.uk/publications/nao_reports/02-03/02031332es.pdf)

National Audit Office – N.A.O. (2005). *Directory Enquiries – from 192 to 118,* London: Stationery Office.(http://www.nao.gov.uk/publications/nao_reports/.pdf)

Neave, Henry (1990). *The Deming dimension,* Knoxville Tenn: S.P.C. Press.

Nelson, Richard R. (1981). 'Research on productivity growth and productivity differences: dead ends and new departures', *Journal of Economic Literature,* vol. 29 (Sept), pp. 1029–64.

Ng, Yew-Kwang (1997). 'A case for happiness, cardinality and interpersonal comparison', *The Economic Journal,* vol. 107 **(**Nov), pp. 1848–1858.

Norwich, J. J. (1983). *A History of Venice,* London: Penguin Books.

Oxoby, Robert J. B. (2003). 'Attitudes and allocations: status, cognitive dissonance, and the manipulation of attitudes', *Journal of Economic Behavior & Organisation,* vol. 52(3), pp. 365–385.

Pahl, G. and Beltz, G. (1988). *Engineering Design: A Systematic Approach,* London: Design Council.

Parkinson, C. Northcote (1958). *Parkinson's law or the pursuit of progress,* London: John Murray.

Perry, Orit, Erev, Ido and Haruvy, Ernan (2001). 'Frequent probabalistic punishment in law enforcement', *Economics of Governance* own pub: (http://www2.gsb.columbia.edu/faculty/ierev/pages/red.pdf)

Press Association (2005). 'Failure shouldn't be an option in class, say teachers', *Education Guardian,* 19 July.

Rawls, John (1971). *A Theory of justice,* Oxford: University Press.

Rhinehart, Luke (1994). *The Search for the Dice Man,* New York: Harper Collins.

Riach, P. A. and Rich, J. (2002). 'Field experiments of discrimination in the market place', *The Economic Journal,* vol. 112, pp. F480–F518.

Rose, Steven, Lewontin, R. C. and Kamin, Leon (1984)**.** *Not in our genes: biology, ideology and human nature,* London: Pelican.

Roth, Alvin E. (2002). 'The economist as engineer: Game theory, experimentation, and computation as tools for design economics', *Economica,* vol. 70 (4), pp. 1341–1378.

Rowe, J. W. F. (1923). *Wages in the coal industry,* London: P S King.

Sacerdote, Bruce (2001). 'Peer effects with random assignments: Results for Dartmouth roommates', *The Quarterly Journal of Economics,* vol. 116(2) May, pp. 681–704.

Schwartz, Steven (2004a). *Fair admissions to higher education: recommendations and good practice,* Admissions to Higher Education Steering Group, Nottingham: Department for Education and Skills Publications (WWW.admissions-review.org.uk)

Schwartz, Steven (2004b). **'**evidence to Commons Select Committee: Admissions to Higher Education'. 25 Nov. **(** http://www.parliament.the-stationery-office.co.uk/pa/cm200405/cmselect/cmeduski/uc41-i/uc4101.htm)

Simon, Herbert A. (1976). *Administrative behaviour: A study of the decision making processes in administrative organisation,* London: Collier-Macmillan.

Smith, Vernon L. (2005). 'Behavioral economics research and the foundations of economics', *The Journal of Socio–Economics,* vol. 34 (2), pp. 135–150.

Sutherland, Keith (2004). *The Party's Over: Blueprint for a very English revolution,* Exeter: Imprint Academic.

Tashman Leonard J. and Lamborn Kathleen R. (1979). *The ways and means of statistics,* New York: Harcourt Brace Jovanovich.

Taylor, Grant A., Tsui, Kevin K. K. and Zhu, Lijing (2003). 'Lottery or waiting–line auction?', *Journal of Public Economics,* vol. 87, pp. 1313–1334.

Treble, John G. (1995). 'On Marrows: Evidence from the Victorian household panel study', *Historical Methods,* vol. 28**(**4), pp. 183–193.

Treble, John G. (1998). 'Points schemes', mimeo *Economics Department,* University of Wales, Swansea: Welmerc.

Treble, John G. (2001). **'**Productivity and effort: the labour-supply decisions of late Victorian coalminers', *Journal of Economic History,* vol. 61, pp. 414–438.

Treble, John G. (2002). 'Intertemporal substitution of effort: some empirical evidence', *Economica,* vol. 70, pp. 579–595.

Treble, John G. and Vicary, Simon (1993). 'Equity, efficiency and insurance: explaining the structure of miners' wage payments in Victorian Co. Durham', *The Economic Journal,* vol. 103(Mar), pp. 481–493.

U. S. Department of Homeland Security (2003). *Yearbook of Immigration Statistics 2002,* Washington D.C: U.S. Government Printing Office,.

van Praag, B. M. S. and Baarsma, B. E. (2005). 'Using happiness surveys to value intangibles: The case of aircraft noise', *The Economic Journal,* vol. 115(Jan), pp. 224–246.

Vernon, P. E. (1953). *Personality tests and assessment,* London: Methuen.

Vernon, P. E. ed (1957). *Secondary school selection: A British Psychological Society Inquiry,* London: Methuen.

Wainwright, Martin (1998). 'Lots of potential', *The Guardian,* 1 Apr.

Wald, Matthew L. (2001). 'Agencies suggest changes to ease la Guardia delays', *New York Times,* 6 Jun.

Wessely, Simon (1998). 'Peer review of grant applications: what do we know?', *The Lancet,* vol. 352 pp. 301–305.

White, Susan and Stancombe, John (2003). *Clinical judgement in the health and welfare professions: Extending the evidence base,* Maidenhead: Open University Press.

Wiliam, Dylan (2002a). 'Toss of a coin "as good as A-levels"', *Telegraph,* 13 Aug.

Wiliam, Dylan (2002b). 'Exam grades "unreliable in indicating ability"', *Guardian,* 14 Aug.

Wilms, Douglas C. (1974). 'Georgia's Land Lottery of 1832', *Chronicles of Oklahoma,* vol. 52 (Spring), pp. 52–60.

Witt, Ulrich (1991). *Reflections on the present state of evolutionary economic theory,* in **Hodgson, Geoffrey M. and Screpanti, E. (eds)** (1991). *Rethinking economics: Markets, technology and economic evolution,* Aldershot: Edward Elgar.

Young, Michael (1958). *The rise of Meritocracy 1870-2033: An essay on education and equality,* London: Thames and Hudson.

Zajac, Edward A. (1995). *Political economy of fairness,* Cambridge, Mass: M.I.T. Press.

Zelleke, Almaz (2005). 'Distributive justice and the argument for an unconditional basic income', *The Journal of Socio–Economics,* vol. 34, pp. 3–15.