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Being Economic: Perspectives on Risk and Rationality

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1. Introduction

> Austrian economics, behavioural/experimental economics, black political economy, critical realism, ecological economics, ersatz economics, evolutionary economics, feminist economics, historical economics, institutional and new institutional economics, Keynesianism/s, Marxism/s, monetarism, neoclassical economics and neo-neoclassical economics, new classical economics, postcolonial economics, postmodern economics, rhetorical economics, social economics, social constructivism, structuralist economics, transaction cost economics, …

The list isn't exhaustive; but it suffices to demonstrate that economics is characterised by a multitude of schools of thought, or methodological approaches to economic phenomena. Some schools of thought overlap and cross-fertilise one another, while some are openly in antagonistic relation; some schools of thought operate across a broad terrain of subject matter, while others focus their attention more narrowly. Few, if any, economists are readily familiar with all schools of thought, and some economists are more pluralist than others in their approaches to teaching, research, and policy. In other words, there isn't a single economic perspective that characterises the discipline and its practitioners – which is why there are jokes along the lines of the large number of economists it takes to change a light bulb (indeed, given so many perspectives, whether the light bulb ever gets to be changed).

But perhaps somewhat unusually for a social science discipline, there is one school of thought that dominates contemporary Anglo-American economics. This is *neoclassical economics*, and its predominance can give rise to the impression from beyond the discipline that neoclassical economics *is* economics. One of the purposes of this essay is to demonstrate that even within the dominant paradigm there are arenas in which reflection, debate and critical exchange take place, particularly with regard to the question of how people respond to situations of *risk*. Moreover, some of the most interesting and productive of these exchanges take place at the interface with cognate disciplines, and especially psychology. This essay will, then, concentrate for the most part on the approach that 'standard' (or 'orthodox') economics takes towards risk, but while acknowledging the porosity of the boundaries of the paradigm. While few economists subscribe uncritically to the standard model, the work of most economists active in the field of risk can best be understood in conjunction – and by contrast – with the framework this model provides for an understanding of risk.

2. Judgement in the face of risk: the standard model

We all encounter situations of risk in our everyday lives, where choices have to be made, and where the stakes can range from the almost trivial to the deeply serious: should I cycle to work with the risk of getting wet if it rains, or should I take the car with the possibility of being held up in traffic and arriving

late? Should I agree to a surgical operation in the hope of being cured of a serious condition but with some risk of dying on the operating table, or should I opt for a less invasive but possibly ineffective form of treatment? If, like standard economics, we assume that human beings in all their variety approach situations of risk in the same way, giving rise to common behavioural responses, then we have the beginnings of a theory of risk with universal applications. But we need an initial set of beliefs about the nature of human behaviour with which to justify that assumption. In standard economics, these beliefs find expression in the paradigm of *methodological individualism*, and they are given axiomatic form in *rational choice theory* and its family of supplementary models.

A feature of this approach - but also of most other approaches to economic behaviour that have arisen under the auspices of modernity – is the primacy of place given to the individual. Under methodological individualism, the focus is upon the individual because it is individuals who perform actions, and so explanation has to be framed in terms of the individual (as against culture, society or the collectivity). Accordingly, most welfare/micro economics in the neoclassical tradition takes the individual as the base unit of analysis. Under rational choice theory, this individual is modelled as purposefully weighing up the potential gains and/or losses entailed by the various actions available to her and then choosing the action she judges best from the perspective of her own goals and interests[1]. Thus, a central tenet of the theory is the belief that human reasoning is *instrumental* in orientation, coupled with the notion that the individual acts *as if* drawing on mathematical logic (in particular, as we shall see, on the calculus of probability)[2]. In highly simplified terms, the standard model of risk, underpinned by rational choice theory, is as follows.

Possible courses of action are called ***Acts***, and may be denoted by A_1, A_2, etc. These are what the individual is deemed to be able to choose between, for example, cycling to work, taking the car, etc. The decision problem is: which of the possible Acts to choose?

Events which the individual in question doesn't control, but which could occur, can be called ***States*** (of the world). For example, at the start of a horse race with 5 runners, there are at least 5 possible States that could occur: horse #1

[1] In this spirit, we find Adam Smith drawing on his observations of individual behaviour to explain the nature and causes of the wealth of nations. His explanation is framed in terms of certain propensities in human nature that are *"common to all men"*, reflecting the belief that the human condition is a universal experience (Smith, 1776, p.12). According to Smith, individuals are naturally predisposed to act in their interactions with one another, not out of pure benevolence, but out of careful consideration of their own best interests. Yet in the competitive environment of the capitalist economic system, such reasoned and atomistic behaviour turns out to be highly advantageous for society as a whole. This is the familiar notion of *the invisible hand*.

[2] It should be emphasized that, as Starmer (2000, p.349) points out, "the conventional approach, interpreted descriptively, seeks to predict which choices *are* made and typically, there is no presupposition that the model corresponds with any of the mental activities actually involved in making choices."

could win; horse #2 could win; horse #3 could win; and so on. These are things outside the control of the individual we are considering – although they may be to some extent under the control of other people (the jockeys, for instance). But as a potential punter, I don't have any control over which horse will win. What I do have control over is the Act I choose – in this case, whether I place a bet and, if so, how much on which horse.

Whichever Act I choose has ***Consequences*** contingent on the State that occurs: if I place a bet on horse #3 coming first, then I stand to win some money if that State occurs, while I stand to lose my stake if any other State occurs. In this example, consequences take the form of gains or losses of money, but they could take many other - sometimes, quite complex and finely detailed - forms in other examples. For instance, if my chosen Act is to cycle to work in shorts and a tee-shirt in the morning, possible consequences include *getting a tan* if the State, S, is sunny, *getting wet* if S = it rains, *getting slightly fitter* if S = all goes smoothly, *getting injured* if S = a car hits me, *getting my hands oily* if S = the chain slips off, and so on.

When an individual is faced with choosing an A before she knows for sure which S will occur, she is not only assumed to consider the various possible consequences contingent on the different possible S's, but also how *likely* it is that each S will occur. For economists, a situation of 'pure risk' has characteristics that distinguish it from other situations of 'uncertainty'. That is, under conditions of risk, the probabilities of the various different States are known to the decision-making individual. In reality, it is rarely the case that there is some precise 'objectively known' risk; so from a decision analysis perspective, the situation can be modelled more generally as if the decision maker attaches some ***subjective probability***, *p*, to each S. This *p* operates as the 'weight' attached to the consequence of that S.

However, since consequences can take many diverse forms, the individual is assumed to be able to 'convert' these consequences into a common currency called ***utility***. Historically, there have been somewhat different concepts of utility used by economists. Though some dislike the following, it probably doesn't hurt to think of utility in terms of the pleasure (or pain) the individual associates with the consequence. To be usable in formal analysis, a numerical utility index number may be assigned to each consequence. In some uses, these index numbers may only have ordinal significance: that is, a higher number attached to consequence c_1 than to c_2 conveys only that the individual in question ranks c_1 as preferable to c_2. But current standard economic/decision theory often requires something stronger: that the numbers are *cardinal*, conveying something about the (relative) *strength* of preference. So, more formally, we can say that, in her response to risk, the (instrumentally rational) individual is seeking to maximise some weighted combination of values from her 'utility function, $U(x)$, where 'x' is some consequence and $U(x)$ is some cardinal index of the subjective value to that individual of experiencing x, and where each $U(x)$ is weighted in some way according to the subjective probability of the different consequences being experienced.

To take a very simple example, suppose there is a full pack of ordinary playing cards, and that one of the cards is to be picked at random from the pack. You are presented with two A's to choose from. If you choose A_1, the card will be drawn and shown: if it turns out to be a Spade, you receive £20; but if it is any other suit, you receive nothing. If you choose A_2, you receive £4 irrespective of the suit of the card. The choice can be represented as follows:

States

Acts		S_1 (Spade)	S_2 (Other Suit)
		p	1-*p*
	A_1	£20	0
	A_2	£4	£4

Even in this apparently straightforward case, several things cannot be directly observed, namely: the utility the individual attaches to the consequences; the weight assigned to each S; and the decision rule being used. In the most widely used theory, *expected utility theory* (EUT), it is assumed that the individual weights the utility of each consequence by the probability (*p*) that the S will occur and then chooses the A which yields the higher weighted average utility. So, if there is a 1 in 4 chance that a Spade will be drawn, then *p* = 0.25; and what the expected-utility maximising individual then decides depends on the relative utility she derives from £20, £4 and 0.

Suppose Person X's preferences can be represented by assigning a utility of 1 to £20, a utility of 0.3 to £4 and a utility of 0 to 0. Then Person X's weighted average utility of the act A_1 is (*p* x 1) + (1-*p* x 0). With *p* at 0.25, this gives an expected utility (EU) of 0.25. Now consider the act A_2. Here, there is the certainty of £4 (that is, £4 is the consequence of both S_1 and S_2, and the probabilities of these states sum to 1), which for Person X has a utility of 0.3; so weighting that much utility by a probability of 1 gives an EU of 0.3. Since the EU of A_2 for this individual is greater than the EU of A_1, Person X will choose A_2. However, Person Y's preferences might be such that the utility of £4 is 0.2; so Person Y would choose A_1 because that A yields him a higher expected utility [3].

At this point, a quick aside is needed to emphasize two features of this approach to risk that may be at odds with a vernacular understanding of risk, or the approaches to risk of some of the cognate disciplines. First, for the economist, risk is not just about downside outcomes (harms or losses, such

[3] It should be noted that assigning a utility of 1 to £20 for both X and Y does not signify that both people get the same pleasure from £20: direct interpersonal comparisons of utility are not part of most modern utility theories. The point of utility indices is only to show the *relative* strength of preference on a *'within-person'* basis.

as *getting wet* in the event that S = it rains). Thus, the act A_1 in the playing card example above is a 'risky prospect' simply because its consequences (although all non-negative in this particular case) vary from one S to another, and each S has some positive chance of occurring. Second, under *subjective expected utility theory* (or, SEU, the extension to EUT), attitudes to risk are understood to vary with the psychological make-up of the individual. Thus, different individuals will be more or less 'risk averse' (and some may be 'risk neutral' while others may be 'risk loving'). However, it is usually expected that any particular individual will demonstrate a *consistency* of attitude in response to the diversity of risky situations; this is to imply that situations of risk described by identical economic parameters will be treated identically by that individual. This latter implication of the theory is important since it explains why, traditionally, standard economics has given little attention to non-economic parameters, such as the *framing* or *context* of decision-making; we shall pick up on this issue later.

What is the connection between the above highly simplified model and the real world? And what purpose is served by having access to a descriptively powerful account of people's responses to risk?

One issue concerning many economists is how to value policy-induced changes in risks, so that the changes that society values most highly can be identified and it then becomes possible to judge how the benefits of such changes can be balanced against the costs of bringing them about. Consider, for example, the question of how to allocate scarce resources within the health service: one might want to compare the costs and benefits of some degree of reduction in the risk of death or damage to health from diabetes with the costs and benefits of some other degree of reduction in the risk of death or damage from meningitis; or, in the area of transport, one might want to compare measures to reduce risks of death and injury to pedestrians with measures to reduce loss of time due to traffic congestion. If the SEU model provided a robust framework for understanding/analysing how people deal with risk, that model would give us guidance about how to elicit people's values – not only *within* particular narrowly defined areas such as health or transport, but *across* different areas of activity. And these values would help us decide how to allocate resources so as to improve the welfare of society in the aggregate.

To bring out these implications of the SEU model, consider the playing card example again. If Person X in this example chooses A_2 rather than A_1 (implying that she prefers £4 for sure, rather than a 25% chance of £20), then there is presumably some amount *less* than £4 such that A_1 becomes preferable to A_2. And, by extension, there is presumably some point at which Person X would be finely balanced (or, in the jargon, 'indifferent') between A_2 and A_1; this point provides a measure of the money value to Person X of A_1, or what is described as her 'certainty equivalent'. Another way of thinking about this is that the certainty equivalent represents the most Person X would be *willing-to-pay* (WTP) to acquire A_1. For expositional purposes, let us

suppose that value is £3.50. Similarly, if Person Y would prefer A_1 to A_2 (implying that he prefers a 0.25 probability of £20 to £4 for sure), there must be some amount *greater* than £4 that would induce him to switch from A_1 to A_2. And perhaps his certainty equivalent is £4.50.

Thus, in principle it should be possible to find the values people assign to risky actions – and by extension, the values they place on *changes* in risk – expressed in money form. Notice that policy calls for a *monetary* expression of value in order to balance the benefits against the costs of bringing about changes in risk, and to decide how best to distribute scarce resources across alternative benefits. The emphasis in standard economics on quantitatively-based methodologies renders it suitable to the endeavour - as long as one presupposes that values exist in measurable form.

The assumption standard economic theory makes is that this approach to valuing relatively simple A's like those above can also be applied, in principle, to all sorts of other contexts to elicit, for example, the WTP to reduce the chance of being killed or injured in a road traffic accident, the WTP to reduce the chance of being a victim of violent crime, or the WTP to reduce the chance of destroying some aspect of the environment. The values elicited can then be made available to policy-makers as an input to their deliberations. Quite apart from policy scenarios of this kind, the theory can also be applied to many other situations; for example, to financial investment, bank lending, betting, insurance, aspects of entrepreneurial practice and even, beyond the conventional boundaries of economics, to the choice of a marriage partner – indeed, to any situation in which a future outcome is mediated by one's choice of action in the current period, and where the probabilities of the different possible outcomes can be quantified, whether objectively or subjectively.

But does the standard economic model actually capture real people's responses to risk? And, bearing in mind the policy applications of the model, to what extent can we rely on the findings of surveys designed to elicit people's values and probability judgements? These are the two critical issues to be considered in the next section.

3. Taking stock of the standard model

In reality, of course, it is no easy task to capture how it is that people respond to situations of risk. There are both theoretical and methodological challenges, and this section provides a flavour of both.

Heuristics and biases

First, SEU is challenged by a great deal of experimental evidence suggesting that people's behaviour departs systematically from SEU in ways that raise doubts about some of the model's most fundamental assumptions. Much of this evidence has been collected by psychologists, and by economists

working at the interface between economics and psychology (see, for example, Koehler and Harvey, 2004). This niche within the discipline has become known as 'behavioural economics', and its by-product has been an extension of the economist's lexicon to include terms such as 'cognitive bias', 'cognitive dissonance', and 'normative fallacies', a development that acknowledges the growing overlap of economics and psychology when it comes to understanding decision-making behaviour (see, for example, Cosmides and Tooby, 1996).

The interaction between economics and psychology has been productive. Drawing on the experimental evidence, attempts to accommodate violations of SEU into standard economic theory have given rise to a large family of alternative models that treat the 'cognitive architecture' of decision-making seriously. These models build on the same basic beliefs about the nature of human behaviour that are outlined in the previous section in so far as the individual is assumed to be trying to identify her best course of action given her particular preferences over consequences[4]. But a major wedge between the SEU model and others of the same family lies in the cognitive perceptions imputed to the individual that determine the way in which weights must be assigned to raw economic parameters. The thought here is that, while the SEU model may have some normative persuasive force, it is inappropriate when it comes to analysing/explaining the behaviour of people who are only *boundedly rational*, that is, who are limited by time, knowledge and/or computational ability and who, as a consequence, are apt to pursue constrained maximisation, and to employ 'fast and frugal' decision heuristics (Gigerenzer, Czerlinski and Martignon, 2002). Thus, a disjunction emerges between rationality as it is conceived in standard economics and rationality as it is conceived in cognitive psychology; this disjunction is expressed by Herbert Simon as follows:

> "The rational person in neo-classical economies always reaches the decision that is objectively, or substantively, best in terms of the given utility function. The rational person of cognitive psychology goes about making his or her decisions in a way that is procedurally reasonable in the light of the available knowledge and means of computation."
>
> (Simon, 1986, pp.S210-11.)

This chapter cannot document all of the wide range of alternatives to SEU in the spirit of procedural rationality. But one of the earliest (and still the best known) of these is *prospect theory* (Kahneman and Tversky, 1979) which engages with the notion that ordinary people do not treat probabilities with the rigorous mathematical logic of standard probability theory. A central proposition in prospect theory (and in other theories following in its wake) is that probability judgements are reached by means of a collection of common

[4] Some behavioural economists go further in suggesting that people tend to engage in *satisficing* rather than utility maximisation; this is to say that people do not pursue the best result but the result that satisfies their 'aspiration levels'.

decision heuristics, or procedural rules-of-thumb, and that these devices introduce systematic 'bias' to the calculus. This bias can take the form of a deviation away from some 'true' or objective value and, in many cases, it represents a violation of standard probability theory. Crucially, the bias means that weights must be attached to raw probabilities to reflect observed regularities in people's *perceptions* of the values of those probabilities. Thus, prospect theory formalises the idea that while people recognise the true values of the probabilities zero and 1, they tend to 'over-weight' small probabilities and 'under-weight' large ones.

Kahneman and Tversky (*ibid*) go on to point to many other facets of the cognitive architecture to surface in experiments, including, the tendency for people to be more averse to losses than they are attracted to equal sized gains when faced with risky prospects, and to be more sensitive to departures from a 'reference level' of well-being than to the absolute parameters of prospects. Crucially, such phenomena imply that preferences are not as stable and consistent as the standard model suggests. Moreover, it would appear that language is far from neutral but carries with it the potential for 'framing effects' when eliciting values and probability judgements. Consider, for example, how one might describe the consequences attached to a risky surgical procedure: a description expressed in terms of mortality rates is likely to elicit a different response to a description expressed in terms of survival rates, with the former appearing less attractive to respondents.

Experiments also reveal that people's values and probability judgements can be unduly influenced by a piece of information that is conveniently to hand, and that comes to act as an arbitrary comparison value, referent, or 'anchor'. Anchors are heuristic devices that have been found to derive from such random 'cues' as spinning a roulette wheel, or a person's telephone number or social security number (see, for example, Tversky and Kahneman, 1974). The anchor provides an initial value that is adjusted as the individual moves through the questions in order to generate a series of plausible answers. As a result, the illusion is created of an ordered pattern of responses, underpinned by a tidy set of 'true' values, a phenomenon known as 'coherent arbitrariness' (Ariely, Loewenstein and Prelec, 2003). Anchoring effects can come into play even when researchers are at pains to point out that (potential anchor) values are chosen randomly or are completely uninformative (Epley, 2004), pointing to the difficulty of designing a research instrument that is reliably free from anchors.

It would seem that we have yet to fully understand how people process – and potentially prioritise and/or discount - the economic parameters of risk, for example, the attention people give to probabilities *vis-à-vis* consequences. Some of the risk perceptions literature (see, for example, Loewenstein *et al* (2001) and Slovic *et al* (2004)) suggests that judgements about certain sorts of events/outcomes may have a significant affective component which can become confounded with estimates of the probabilities involved, making respondents less sensitive to the numerical component. Thus, the idea of being burgled may weigh so heavily in the imagination that it overwhelms consideration of other parameters, such as the (perhaps, small) likelihood of

the event actually happening. Another strand of the literature suggests that people disproportionately weight salient, memorable or vivid evidence, even when information that is objectively of better quality is available to them (Tversky and Kahneman, 1973).

In exploring these ideas, Loomes & Mehta (2006) find that when survey participants are given the opportunity to revise their estimates of the likelihood of being burgled following information about the *actual* number of burglaries in their area, few people take up the opportunity, even when their initial estimates are wide of the mark. Further research is needed and so, at this stage, we can only speculate as to the reasons why this might be the case. Thus, an aversive affective response may, indeed, be at play. It may also be that the 'cue' provided by official statistics is deemed to be substandard or defective compared to some privately-held anecdote perceived as salient to the situation (say, 'my neighbour was burgled last week'). Or it may be that, for attitudinal reasons, people are unwilling to change their minds once a judgement has been reached. Whatever the explanation, questions arise about the accuracy of the individual's estimates and/or perceptions of risk.

It needs to be emphasized that whether or not decision heuristics are generating the 'right' decisions from a normative point of view is not an issue for descriptive theories of risk. Decision heuristics may, indeed, lead people into errors of judgement[5]; but they may also lead to quite reasonable/sensible paths of action for optimising individuals in the face of limited time and computational ability, cognitive illusions, or problems that are computationally intractable. Moreover, as Gilovich and Griffin (2002) observe, decision heuristics may yield 'quick and dirty' solutions, but they draw on underlying processes that can be highly sophisticated. So the admission of heuristics to the economist's toolkit should not be taken to imply a shift to treating individuals as careless or illogical; boundedly rational individuals simply pursue their own interests in the best way that they can under the circumstances. Perhaps more unnerving for standard economics is the way in which decision heuristics rub up against methodological individualism which, in its pure form, sees no place for the kind of institutionalised practices and procedures invoked by the behaviouralists in economics and psychology. In contrast, the institutionalists within economics would applaud the recognition that the institutional environment matters: in a critique of standard economic models, one of the leading proponents of institutional economics observes:

> "Even at the level of fully deliberative decision-making, institutions and social culture make themselves felt, not merely as constraints, but also in moulding the formation of preferences and enabling the acquisition of knowledge upon which choices are made."
> (Hodgson, 1993, p.124.)

Standard economics is, then, at an interesting, if uneasy, juncture with regard to the modelling of behaviour in situations of risk. Moreover, each of the many

[5] And there is evidence to suggest that people do not necessarily abandon favoured procedures even when confronted with their errors (Rabin, 1998).

alternatives to SEU can account for *some* of the experimental evidence but, as yet, no single model would appear to account for all of it. This suggests we have yet to understand the subtleties of the cognitive architecture of decision-making, for example, why it is that people seem to be drawn to one decision rule in one context and another decision rule in a different context. Another issue is the nature of the interplay in probability judgements between the learned (possibly, evolving) heuristic mechanisms that the behaviouralists point to, and the more analytic and controlled procedures that sit more easily with standard economics (see, for example, Kahneman and Frederick, 2002). Issues like this beg the question of whether economics can, in fact, deliver a *general* – that is, context-invariant – theory of risk. Indeed, some would argue that models of behaviour framed by bounded rationality are necessarily of short range and domain-dependent (Brandstätter, Güth and Kliemt, 2003). In the meantime, while the evidence compels some economists to reject the SEU model, there is no consensus on an alternative and, by default, SEU largely retains its status as 'the standard model'.

Abstraction versus naturalism

Much of the evidence for and against SEU and other candidate models is gleaned from controlled laboratory-based experiments. But it is not at all clear that the laboratory is the best environment in which to determine people's responses to risk. At issue are the *kinds* of situations used to develop and test hypotheses and, specifically, the degree of abstraction/naturalism attached to those situations. Laboratory experiments typically involve asking individuals to make choices between, or to put values on, relatively simple 'lotteries' offering modest sums of money as an incentive, and where the probabilities of the different possible S's are explicitly stated. These lotteries usually employ some well-defined random process such as spinning a 'wheel of fortune' or picking numbers or coloured balls at random from a bag whose contents are declared and can easily be verified by participants to the experiment (for reviews, see Camerer, 1995).

In principal, there is no reason why models of behaviour should not be developed and tested in this way. There is nothing which says that the state of the world 'a blue ball is drawn from a bag containing equal numbers of blue, green and yellow balls' is different in terms of the theory from any other state, say, the state 'the chain slips off my bike on the way to work'. Nor is the consequence 'you receive £5 in cash' regarded as being any more or less the subject matter of the theory than the consequence 'my hands get oily'. Indeed, it is often argued that using a simple choice problem where the probabilities are generated by some 'pure' random device, and where the consequences are straightforward and relatively simple sums of money, is the cleanest kind of test, giving a theory its best chance of being validated. An implication of this argument is that, if the theory fails to perform well under these clean and simple conditions, it should be suspected of being even less likely to perform well under the more complex non-experimental conditions to be found in field surveys.

Against this, it has been suggested (see, for example, Loewenstein, 1999) that people may actually do less well with tasks that are somewhat abstract and devoid of social context, and they may do rather better when making probability judgements and assigning values in the context of the more 'natural' or 'real-world' settings to be found in surveys of the public. The force of this suggestion comes from the thought that judgements about the probabilities of real events of some personal significance – say, the risk of ill health as a result of pollution of the environment, or the likelihood of one's home being burgled - may come more easily to people than thinking about artificial and unfamiliar tasks such as drawing balls at random from a bag. Indeed, when economists and econometricians work with non-experimental data, they typically assume that people do, for the most part, form reasonably good expectations about risky situations that are of personal concern.

In seeking to address this issue, Loomes and Mehta (2007) ask if there is a spectrum of different 'types' of risk that people find more or less easy to deal with when making probability judgements. They presented survey participants with various kinds of socially-situated risks alongside some more abstract 'pure chance' events, and investigated people's handling of these categories for differences in the accuracy, consistency and sensitivity of probability judgements. The 'pure chance' events were ones for which an 'objective' probability could be calculated; for example, the result of tossing a coin or throwing a die. The more naturalistic socially-situated events were of two types: 'public' events were of the kind one could, in principle, bet on (and some people do), such as whether snow will fall at a particular location on a stated day, and whether there will be a change of Prime Minister in the UK within a given time period; while 'personal' events were those of the kind that more intimately affect the individual and are most likely to be the subject of surveys, such as the likelihood of one's home being burgled or of being injured in a road accident within a given time period.

One of the findings of the study is that people demonstrate little sensitivity to the time dimension of socially-situated events, a phenomenon known as 'temporal scope (in)sensitivity'[6]. Moreover, sensitivity to temporal scope appears to vary between the different types of event, with sensitivity being slightly higher (although far from consistent with standard probability theory) for 'public' events compared to 'personal' events. Indeed, even those respondents who dealt best with the 'pure chance' events (and whose level of educational attainment was found to be above average), demonstrated very little scope sensitivity when it came to the more intimate events that one would

[6] From the point of view of standard statistical theory, the longer the time period, the greater the chance of an event taking place. However, Loomes and Mehta *(ibid*) find that mean estimates of the likelihood of one's home being burgled within a five-year period are barely higher than mean estimates of the event occurring over a 12-month period. Other manifestations of scope effects are well-documented in the survey literature; see, for example, Kahneman and Knetsch, 1992; Desvouges *et al*, 1993; and Schkade and Payne, 1994.

expect to be of close personal significance, such as the likelihood of being burgled or injured in a road accident.

Findings like this suggest the assumption that decision makers have correct expectations must, indeed, be treated with some scepticism (Manski, 2004). But to adjudicate on this issue, we need to know more about variations in people's responses to risk in the context of different types of event, such as which types of event generate the most/least valid and reliable probability estimates, and why this might be the case. More fundamental issues are also at stake. Again, the issue arises of whether economists are engaged in a hopeless endeavour when they aspire to a context-invariant model of behaviour in response to risk. And is it simply a case of getting the methodology right and the 'right' responses will follow? In other words, is it the *theory* or the *methodology* that is creating difficulties – or is it a bit of both? As we shall see next, a number of problems have surfaced in surveys that add fuel to the fire of this debate.

Survey considerations

Economists' surveys of public attitudes and responses to risk draw on a range of protocols. The most widespread of these in recent years is the *contingent valuation method* (CVM). In broad outline, CVM presents survey participants with a hypothetical market where the good or service to be valued (for example, a reduction in the risk of death as a result of a road accident) is bought and sold. Participants are questioned about their WTP to acquire the risk reduction (and, often, a range of alternative goods). They may also be questioned about their *willingness-to-accept* (WTA) an increase in risk in return for some monetary compensation. The results are then aggregated to provide summary measures of people's preferences, values and attitudes over risky prospects[7].

The status of survey findings matters because, as we have seen, policy can be heavily influenced by the results of surveys interpreted on the basis that people's probability judgements are broadly sound, particularly when it comes to events of personal significance. Unfortunately, the survey literature abounds with evidence of anomalies, disparities, insensitivities and inconsistencies in people's responses to risk. Evidence of this kind leads some researchers to argue that survey findings might in many cases be so unreliable as to offer only flimsy guidance for policy purposes (Dubourg, Jones-Lee and Loomes, 1997).

Some of the problems associated with surveys turn on the (often, tacit) assumption of standard economics that people are endowed with, and are fully cognizant of, a set of preferences and values relating to every conceivable good and service; indeed, the rational economic agent of

[7] For a review of differences in detail in CVM, see, for example, Schwab Christe and Soguel, 1995. And for a review of the role of CVM in the policy arena, see Portney, 1994.

standard economics is depicted as (no more and no less than) a well-behaved set of preferences, since, traditionally, all that has mattered to the economist about individual identity and subjectivity is how preferences tie in to consumption choices. This being the case, the task facing proponents of CVM is simply one of bringing preferences and values to the surface with the 'right' kind of elicitation procedure[8].

It is not at all clear that the assumption is well-founded even in the case of familiar consumption goods such as food items (see, for example, Frederick and Fischhoff, 1997)[9]. But any difficulties facing survey participants are compounded when the goods in question are unfamiliar non-marketed goods of some complexity. Indeed, Diamond and Hausman (1994) go so far as to argue that CVM cannot measure the preferences it purports to measure because those preferences simply don't exist.

To flesh out this issue, consider the following example: suppose the Department of Health thought that new resources would allow them to introduce measures that would reduce the incidence of meningitis by 10%, *or* measures that would reduce the number of new cases of late-onset diabetes by 5%. Since there are insufficient resources to do both, the question is: which measures should be prioritised? Weighing up the costs and benefits of goods like these and assigning values to them is no easy task for the survey participant. It can be argued that preferences and values are not tidily pre-packaged and 'ready-to-go': people have to be sufficiently familiar with the goods in question, and experienced in dealing with them, in order for preferences to exist and to be stable, and for values to represent actual attitudes to risk. Moreover, survey goods often have a substantial 'public good' component, which can make it difficult for people to think about the costs and benefits to themselves, in isolation from the broader issues of the benefit to others, and the sharing of costs.

These special attributes of survey goods introduce a wide range of difficulties that economists need to negotiate in the attempt to generate an accurate and reliable picture of people's preferences and values in the face of risk. The difficulties include the following.

(i) The individual may not be readily familiar with – or be able to process easily – the full range of A's from which to choose. She may have only limited information about the possible S's. If the full range of S's is unknown, their respective probabilities cannot possibly be known; and even when a number of S's can be identified, it may still be the case that there is poor information about, or a poor understanding of, the probability of each S occurring.

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[8] In this spirit, Haneman (1994) argues that one needs to adopt a procedure to minimise bias while accepting some lack of precision; and Baron and Green (1996) suggest that greater accuracy can be achieved by tinkering with the procedure.

[9] For a more wide-ranging critique of the assumption of well-behaved preferences that draws on the insights of psychology, see Rabin (*ibid*).

(ii) Although standard economics tends to assume that people are the best judges of their own preferences, in reality people appear to have rather imprecise knowledge of their values, particularly in the context of unrehearsed situations, and situations involving complex states. Even the relatively simple playing cards example above can pose problems such that a typical respondent might say "Well, I'm sure I'd rather have A_1 than £2, and I'm sure I'd rather have £8 than A_1; but it's hard to say which sum in between would be precisely as good as A_1." And if that is the case for something like A_1, then it is much more likely to be the case when the question is about a small change in an already small and imperfectly known chance of an unfamiliar and maybe hard-to-imagine consequence, such as serious illness, debilitating injury or premature death. Goods like these may, indeed, be of close personal significance; but the task of trading off money for such benefits is beyond the normal experience of most people and so it is not entirely surprising if preferences and values are poorly formed.

(iii). It is often (tacitly) assumed that when survey participants provide a range of probability estimates, there is a 'true' value lying somewhere in the middle of the range. However, Loomes and Mehta (2007 *ibid*) find that even people with above-average levels of educational attainment can be prone to errors of calibration, suggesting that one or both of the values at the extremes of the range is likely to be wrong and, hence, that the assumption is unsafe.

(iv) Given the constraints of research budgets, the kinds of methods used by economists to elicit values from members of the public often have to be administered in interviews, or in group sessions, lasting no more than a couple of hours (and usually rather less). Bearing in mind the complexity of the subject matter and the possibility of a lack of precision in people's knowledge of their own preferences, the patterns of values obtained are liable to vary considerably with the techniques used to elicit them. For example, Covey *et al* (1998) conducted a survey designed to investigate the benefits of reducing the risk of death or serious illness resulting from egg-borne food poisoning. One of their key findings was that the WTP for a reduction in the risk of death is significantly affected by the order in which questions are asked, a result that adds to the long list of failures of the elicitation procedure to generate stable results.

(v) Yet another issue of context is how far the value attached to a risky prospect may be influenced by the number and/or nature of the A's available. The motivation is this. In reality, public policymakers have to make decisions about a whole raft of alternative possible actions. But when studies of public preferences are conducted, they tend to be commissioned in isolation. For example, on separate occasions, government departments/agencies have commissioned studies to estimate the value of reducing the risk of death or injury in road accidents, the value of reducing the risk of illness/death due to food poisoning, and the value of various possible health benefits derived from a reduction in air pollution. In each case, respondents have been asked about

the particular risk in question, and the implicit assumption has been that the answers to each study can each stand in their own right, and be used to inform policy. But suppose that policymakers are considering introducing measures on all three fronts: can we safely assume that the amount people say they are willing to pay for each risk reduction, when asked about it *separately*, also reflects the amount they would be willing to pay in total if all three measures were introduced together? In principle, this *should* be the case. But is it? The intuitively plausible suspicion is that when people are being asked to focus on a particular risk, they overestimate their true concern about that risk relative to others that are not the subject of the investigation; as a result, each independently estimated value of a risk reduction is (greatly) in excess of what it would be if considered in the context of a 'collective portfolio' of risk reductions.

(vi) A related matter is the concern that what people *say* when asked to focus on a particular risk may be at odds with what they *actually do* in the regular conduct of their lives, where the attention they give to any one risk is necessarily embedded in the broader spectrum of risks they may be facing, as well as the many other goods and services they want to devote time and resources to. Thus, the artificiality of the scenario in which values are elicited might be leading to distorted responses.

(vii) When people are asked to respond to surveys, they may be trying to do the best they can to give honest and accurate answers to the questions put to them. But the possibility arises that when people are not required to spend real money of their own, but to consider hypothetical situations, their responses may be prone to 'strategic bias'; this is to say that the value assigned to a risk reduction might be intentionally in excess of actual WTP with a view to influencing policy. Alternatively, inflated values may be supplied simply because the participant wants to signal that they think the item on offer (say, a safety improvement or a reduction in the risk of pollution) is 'a good thing'. Where this is the case, it can be argued that WTP is not so much an expression of economic value as an indicator of attitude (Fischhoff, Slovic and Lichtenstein, 1980).

Given the length of this list of survey considerations, should economists despair? The next section attempts to bring some coherence to competing perspectives on what the future might hold for research into risk.

4. Some summary comments

So how do ordinary people respond to risk? The standard economic model sketched out in Section 2 above *might* provide an answer to this question. Yet we've seen that the drive to develop and test hypotheses relating to this and alternative models raises serious issues.

Four broad perspectives can be identified in economists' responses to the theoretical and methodological issues that have surfaced in risk research; these perspectives provide a summary commentary on the standard approach to risk, and they each demonstrate some room for optimism with regard to how economists might pursue an understanding of risk in the future.

First, there are those proponents of CVM (and other closely related methodologies) who are committed to the idea that preferences and values exist and that they behave more or less as standard economic theory supposes. Here, the thought is that if we can only get the right procedure in place, all those unfortunate anomalies and inconsistencies in people's survey responses will simply disappear (see, for example, Mitchell and Carson, 1989).

Second, there are those who raise serious, potentially terminal criticisms of CVM but who remain firmly committed to standard economic theory. From this perspective, the values elicited under CVM and similar protocols are unacceptable as long as preferences deviate from the consistency requirements of standard theory – in other words, primacy is assigned to the theory rather than to the empirical world. Thus, Diamond and Hausmann (1994) assert that since contingent valuation responses are inconsistent with economic theory, reliance on such survey methods for policy guidance is misguided. In a similar spirit, Duborg (1995, p.139) argues as follows:

> "The suggestion is that monetary measures of preferences for safety are not just imprecise, but effectively unconstructed, and that this seems to call into question not only the usefulness of CV results for social objectives, but also the validity of contingent methods themselves for the valuation of certain non-market goods."

Third, there are those raising a critique of CVM from beyond standard economic theory (but whose views resonate with some more heterodox schools of thought within economics). From this perspective, the conceptual apparatus of standard theory is at odds with the conceptual apparatus of ordinary people and, hence, no amount of tinkering with CVM procedures – or other quantitatively-based methodologies - will resolve the issues outlined above. Clark, Burgess and Harrison (2000) are representative of this camp. They argue that CVM may not be a good methodology for capturing complex, cultural values for nature and landscape, while suggesting that some 'measure' of value can be obtained, but only by seriously rethinking the methodology to systematise and incorporate *qualitative* valuations. This is a point of view that resonates with the social constructivists and some of the institutionalists within economics who are sharply critical of the exclusive focus in standard economics on quantitatively measurable phenomena.

And fourth, there are those taking a more neutral position with regard to CVM but while broadly subscribing to standard economic theory; this would include economists who would like to believe there are values to be measured, but who are unsure as to whether it is the theory, the methodology, or both, that

hinder the task of capturing people's preferences, values and attitudes to risk (see, for example, Jones-Lee *et al*, 1995).

Clearly, there are points of tension between competing perspectives. As in most intellectual endeavours, tension marks out the most productive arenas of engagement and debate, and two inter-related topics in particular are galvanising the attention of economists when it comes to risk.

The first topic concerns the cognitive architecture of decision-making. It would seem that decision heuristics are a part of the conceptual apparatus that procedurally rational people bring to the table when processing the parameters of decision-making and formulating their responses to risk. Another way of saying this is that *perceptions matter*. Thus, one of the trajectories in risk research is building on the existing relationship between economics and psychology to develop a more refined understanding of the range of heuristics that people employ and the contingencies attached to behaviour. Here, it can be argued, the challenge for economics is to generate more accurate predictions without sacrificing too much in terms of generality and tractability (Fudenberg, 2006).

The second topic concerns the wider environment in which decision-making takes place. Amongst some economists, there is growing recognition that people are socially and/or institutionally embedded and, hence, that parameters beyond those described in the standard economic model can influence behaviour. Another way of saying this is that *context matters*. This idea sits uneasily in the framework provided by standard economics, and some economists would reject it; it is less surprising from the perspective of other schools of thought within economics, particularly, institutional economics, critical realism and social economics[10]. From the point of view of the institutionalists, the atomistic agent of standard economics is overly abstract and simplistic in a world in which people are socially embedded, and in which information, and the ability to process it, are imperfect. These elements of the real world have powerful implications for the way in which responses to risk are to be analysed and understood. Thus, the institutionalists point to the array of value systems that potentially bear down on behaviour. They also point to the possibility that individuals may have non-economic agendas to pursue in decision-making, including non-materialistic ones such as a concern for the welfare of others (that cannot at times be entirely separated from a concern for the self). As we have seen, the behaviouralists for their part point to the role of rules-of-thumb in processing information, and to the influence of language on people's responses to risk. From this perspective, the way forward is to treat seriously the social/institutional architecture of the environment. It may be that economists

[10] For a review of the wide range of heterodox economic approaches to individuality and subjectivity, see Davis, 2003. While these approaches raise a powerful critique of standard economics, they are not covered in this essay since, for the most part, they do not explicitly address risk.

have a great deal to learn in this regard from the cognate disciplines, including not just psychology, but sociology and cultural theory.

The conceptual space that is emerging in contemporary risk research is marked by a complex of factors that includes, but also that extends beyond, the raw parameters of the standard economic model. In the light of theoretical and methodological issues, and alongside the need for discriminating policy interventions, economists continue to hone their understanding of how people respond to situations of risk, as well as the techniques that might be used to elicit preferences, values and attitudes. That there is a plurality of perspectives on difficult issues, and exposure to the insights of the cognate disciplines, is something to celebrate, since it suggests that economics is not entirely constricted by the dominant logic of neoclassical theory.

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