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**Cost-benefit analysis as market simulation:
A new approach to the problem of anomalies in
environmental evaluation**

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The starting point: how to evaluate environmental impacts of policy options.

E.g. In UK: 'managed re-alignment' of coastline vs 'hard defences' in response to progressive erosion (intensified by rising sea levels).

Policy appraisal includes conventionally economic costs and benefits (e.g. construction costs, buildings protected or not, flood damage to property), ...

... but also environmental effects (e.g. habitat protection/loss, landscape value, amenity value of beaches).

How do we bring all these effects into a single evaluative framework? Economists' standard answer: CBA.

How should CBA be done? In UK, the authoritative source is the Treasury Green Book.

This recommends using 'market values' where possible; but

Where market values are not available for an identified cost or benefit ... The preferred method of valuation is to simulate the market by estimating the 'willingness to pay' (WTP) or 'willingness to accept' (WTA) [for] a project's outputs or outcomes.

How to estimate WTP/WTA? Green Book says: Where possible, use revealed preference methods (e.g. inferring valuations of environment from variations in property prices); but if necessary, use stated preference methods (e.g. contingent valuation surveys).

Problem I want to address: what do we do when attempts to estimate WTP/WTA fail to uncover coherent preferences?

Increasing evidence from behavioural economics that in many situations coherent preferences don't exist.

This particularly noticeable in stated-preference studies (because individual-level data collected under controlled conditions). Some well-known examples:

WTA/WTP disparities: stated valuations much higher when respondent considers giving up an existing good, rather than receiving a new good.

Scale/ scope insensitivities: stated valuations are insufficiently responsive to changes in the scale/ scope of what is being valued.

Influence of irrelevant cues (e.g. 'starting point bias').

This is an instance of a more general problem in economics.

In economics, most policy guidance is based on the criterion of preference-satisfaction. ('Market values' are accepted because they are supposed to reflect preferences.)

We elicit preferences of (representative) individuals from prices, choices, survey responses etc; then we infer how policy proposals impact on those preferences.

Standard methods require the assumption that individuals' preferences are coherent, i.e.

- * stable (not liable to arbitrary or random changes);
- * context-independent (not affected by 'irrelevant' changes of 'frame');
- * internally consistent (i.e. satisfying consistency conditions of rational choice theory).

So, if preferences are not coherent (as in stated-preference examples, and as in other evidence), normative economics is in trouble.

I propose a strategy for dealing with this problem.

Key idea: to retain the principle that CBA is market-simulation, but to re-examine what markets do for us, when we don't have coherent preferences to be satisfied.

But to provide orientation, I first look at a strategy that has been proposed by leading behavioural economists.

Libertarian paternalism

The preferred approach of US behavioural economics establishment:

Cass Sunstein and Richard Thaler [S&T]. 'Libertarian paternalism is not an oxymoron'. *University of Chicago Law Review*, 2003. (Short version: *AER* 2003)

Colin Camerer, Samuel Issacharoff, George Loewenstein, Ted O'Donoghue and Matthew Rabin. 'Regulation for conservatives: behavioral economics and the case for "asymmetric paternalism" '. *University of Pennsylvania Law Review*, 2003.

Basic idea: normative economics is about well-being; preference-satisfaction is only a means to this end.

If preferences are incoherent, how can they be measures of well-being?

So: accept that individuals may make 'wrong' choices; propose paternalistic regulations to 'steer people's choices in directions that will improve their own welfare' (Sunstein & Thaler); but try to impose as few restrictions as possible on free choice.

(But regulation to reduce choice is OK if it increases welfare and if individuals still have 'enough' choice over 'reasonable' options.

'How much choice should people be given? Libertarian paternalists want to promote freedom of choice, but they need not seek to provide bad options, and among the set of reasonable ones, they need not argue that more is necessarily better.'

According to S & T, the findings of behavioural economics force us to recognise that paternalism is 'inevitable', that the idea that there are 'viable alternatives to paternalism' is a 'misconception', and that the anti-paternalist position is 'incoherent', a 'nonstarter' (2003b, pp. 1164-65, 1182).

The cafeteria

S&T use example of a cafeteria 'at some organisation', in which dishes are arrayed along a counter; customers walk along the counter to a check-out. The director of the cafeteria [exemplifying a 'planner'] notices that customers tend to favour items presented earlier on the line. How should she order the items?

Specifically: which should come first, puddings or fruit? - when director believes that fruit is better than puddings for her customers.

S & T consider possible criteria for the cafeteria director. The only credible ones on their list are:

- (1) Give customers 'what she thinks they would choose on their own'.
- (2) Do what she thinks is best for customers (fruit first).

But (1) is a 'non-starter', because 'what they would choose' depends on the display - and that's what has to be decided. So 'no viable alternative' to (2), even though it is paternalistic.

Notice the absence of:

- (3) Choose the display which she expects will maximise profit.

Typically, this criterion will produce a definite answer, even if preferences are incoherent. But is it a good answer?

Consider what competitive markets deliver (even if preferences incoherent).

For full analysis: see Robert Sugden, 'The opportunity criterion: consumer sovereignty without the assumption of coherent preferences', *American Economic Review* 2004.

Markets are based on mutual advantage. The rules of the market allow all mutually-agreed transactions to take place. Further: in a competitive market, price signals provide us with the information with which to make all mutually-agreeable trades, however complex (i.e. exploit all potential gains from trade).

Note: 'advantage' is defined in terms of each party's willingness to trade 'on the day', not well-being or consistent preferences.

The capacity of the market to realise gains from trade is not dependent on consistent preferences. All that is required is that each agent's surplus from any given trade 'on the day' can be identified ...

For this, it's sufficient that individuals are price-sensitive, i.e. at any given moment, buy at the lowest available prices and sell at the highest available prices.

(On-course betting in UK as an example.)

In competitive equilibrium (defined without assuming coherent preferences, but only profit-seeking behaviour by arbitrageurs), all opportunities for mutually advantageous trades are realised.

Or: the market gives each of us what we want and are willing to pay for, when we want it and when we are willing to pay for it.
This is consumer sovereignty.

Ask: Is my [your] consumer sovereignty valuable for me [you]?

(Notice, not: Do I [as planner] judge that consumer sovereignty promotes people's well-being?)

My intuitive answer: Yes (even if my preferences are incoherent).

I argue (in other papers) that this answer is philosophically valid.

What about the cafeteria?

The profit-seeking director is seeking out opportunities for mutually advantageous transactions with her customers. Since I am a potential customer, this is good for me.

So far, analysis has been of private goods. What about public goods?

Traditional idea of CBA as market simulation:

Competitive markets induce economic efficiency (= preference-satisfaction) in supply of private goods; they fail to do this for public goods (free-rider problem); so let's use CBA to simulate the efficiency properties of markets when supplying public goods.

My proposal:

Competitive markets realise all opportunities for mutually-advantageous trades in private goods; so let's use CBA to simulate the surplus-creating properties of markets when supplying public goods.

So, CBA has to measure the surplus created by policies which supply public goods (and impose costs on taxpayers).

How should surplus be measured?

It's an essential part of consumer sovereignty that surplus is measured at the moment of consumption.

In markets, entrepreneurs seek out opportunities to create surplus in this sense. E.g. the gift shop which anticipates the tourist's transient desire for a souvenir.

So, markets respond to what consumers are expected to be willing to pay for, at the moment of consumption - not to consumers' prior beliefs about what they will want, and not to their later judgements about what they now wish they had wanted.

So: if CBA is to uphold consumer sovereignty, it should measure surplus at the moment of consumption.

This principle is implicit in many of the conventions of CBA.

Example: Imagine a CBA of a policy of congestion charging on urban roads. Do we:

(1) ask individual citizens to state their net WTP/WTA for the whole package, viewed *ex ante*; or

(2) use transport modelling methods to predict specific effects of the policy, then predict individuals' actual WTP/WTA for these effects, when they occur (e.g. using consumers' surplus measures)?

Standard practice is (2). Planners are acting as 'social arbitrageurs', anticipating people's wants and realising what, ex post, will be mutually advantageous multilateral transactions.

Now, a case in which the conventions of CBA are less clear.

Measuring the net benefits of changes in environmental effects (e.g. noise, visual intrusion, air pollution) on individuals as occupiers of property. Two standard CBA methods:

Hedonic pricing: investigate how property rents vary with (say) noise; use this information to predict property value effects of policy; treat price differences as market values of degrees of quiet.

Stated preference: ask a representative sample of people their WTP for noise reduction, or WTA for noise increase.

Significant difference:

The stated preference survey asks individuals now to state WTP/WTA for streams of future benefit/disbenefit.

Hedonic pricing observes WTP/WTA in an ongoing market. This is closer to the moment of consumption.

A puzzle: Suppose we are comparing two spatial distributions of noise, A and B. Does it matter whether A or B is the 'do nothing' option?

For the stated preference method, Yes. WTA valuations usually much larger than WTP.

For the hedonic pricing method, No. Predictions of prices at different noise levels are direction-neutral.

But both methods are trying to measure the same effect! Why this difference?

My suggested answer:

WTA/WTP disparities occur because people's preferences are reference-dependent, i.e. are influenced by reference points. Losses relative to reference points have greater affective significance than gains.

But reference points adapt to changes in circumstances. So, most people, most of the time, are close to their reference points (if they move away, their reference points follow behind).

In the stated preference survey, a flow of benefits over time is evaluated relative to a reference point at one moment (the moment of the survey). No account taken of how reference points adapt.

The hedonic pricing method evaluates benefits over time relative concurrent reference points; so takes account of adaptation.

Implication: WTA/WTP disparities may be more significant in stated preference data than in market prices ...

... not because stated preference surveys fail to elicit 'true' preferences, but because they measure surplus further from the moment of consumption.

This suggests new approaches to the problem of 'anomalies':

- * When different elicitation mechanisms imply different valuations, favour moment-of-consumption mechanisms.
- * Investigate the general mechanisms which cause differences between stated preference responses and 'moment of consumption' valuations; then use findings to re-calibrate stated preference data (where moment-of-consumption valuations are infeasible) -- e.g. current research on effects of market experience on WTA and WTP.

And a more general message:

The principle of consumer sovereignty can be understood in a way which does not presuppose preference coherence, and which can be used in CBA.

So, while accepting that individuals sometimes lack coherent preferences, one can use many standard CBA methods ...

... and remain a robust opponent of paternalism.

Thank you for listening.

