

Cost–Benefit Analysis

Second Edition

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Preface and Acknowledgements

In 1971 I published a short text on cost-benefit analysis which, warts and all, has enjoyed some considerable commercial success. It was followed a year later by Ajit Dasgupta's and my *Cost-Benefit Analysis: Theory and Practice* (Macmillan, 1972), which remains in print. In the late 1970s it was more than obvious that the small text, which was intended largely as a student revision book, needed substantial updating and correction. That project, like Topsy, grew and the end-result was my text with Chris Nash, *The Social Appraisal of Projects: A Text in Cost-Benefit Analysis* (Macmillan, 1981). Equally obvious, however, was the fact that we had gone well beyond the publisher's instruction to write a successor to the small cost-benefit book. Since sales of the 1971 book continued to be reasonably buoyant, it was evident that there was still a market demand for a brief 'guidebook' to CBA. This 'new edition' of the 1971 text is that replacement, but it has been *completely* rewritten. What remains, however, is the central message of the 1971 text: that there is no unique way of carrying out cost-benefit studies, nor should there be, and on that I remain totally unrepentant, despite the strictures of my colleagues such as Professor Ed Mishan who have so eloquently argued the opposite but not, in my view, convincingly. Other features remain, I hope, unusual enough to attract the same audience that approved of the 1971 edition.

Preface and Acknowledgements

My debts to others are, literally, too numerous to mention. Many of my working partners will see sections that owe much to their influence. Other colleagues may note passages in which I have especially gone out of my way to explain and defend views which I know they disapproved of, and may still do so. However, while not implicated in the errors that may remain, I must record enormous gratitude to Chris Nash for many years of 'internal' debate on cost-benefit, and to my good friend Jean-Philippe Barde of the OECD, Paris, for insisting always that technique without relevance explains rather too much of the disrepute that academic economists bring on themselves. The text was written during my last year at Aberdeen University. But for Winnie Sinclair, an embodied technological revolution in herself, this and so much else would simply never have appeared. I am forever grateful.

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D. W. PEARCE

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The Foundations of Cost–Benefit Analysis

Cost–benefit analysis (CBA) excites opinion among economists and non-economists. Referring to the attempt by CBA to express all benefits and costs in monetary terms, even where we have no market in the benefit or cost in question, and, indeed, *especially* where we have no such markets, Self (1970) has remarked:

Cost–benefit analysis gets its plausibility from the use of a common monetary standard, but the common value of the £ derives from exchange situations. Outside such situations, common values cannot be presumed, and symbol and reality become easily confused . . . To call these judgements £s is to engage in a confidence trick – to exploit the ordinary man's respect for the yardstick of money in what are actually non-monetary situations. (Self, 1970, p. 8)

The same central feature of CBA worried Schumacher (1973):

To press non-economic values into the framework of the economic calculus, economists use the method of cost/benefit analysis. This is

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generally thought to be an enlightened and progressive development, as it is at least an attempt to take account of costs and benefits which might otherwise be disregarded altogether. In fact, however, it is a procedure by which the higher is reduced to the level of the lower and the priceless is given a price. It can therefore never serve to clarify the situation and lead to an enlightened decision. All it can do is lead to self-deception or the deception of others; for to undertake to measure the immeasurable is absurd and constitutes but an elaborate method of moving from preconceived notions to forgone conclusions . . . what is worse, and destructive of civilisation, is the pretence that everything has a price or, in other words, that money is the highest of all values. (Schumacher, 1973, pp. 41-2)

It would be unfair to the critics to suggest that the sole focus of all their misgivings is the attempt to put money values on non-marketed things. There are many other stated objections, ranging from discrimination against future generations, an overly narrow definition of what any policy decision should be about, the alleged neglect of income distribution, the potential for 'rule by experts' given the complexity of any rigorously executed CBA, and so on. Many of these objections will be analysed in the course of this book. The remarks by Self and Schumacher, however, serve to indicate that some care needs to be taken in understanding just what the basis of CBA is.

We may begin with a definition. We define a *rational choice* as one in which an individual chooses an option when the gains from the action in question exceed the losses. For gains and losses we can use the terms 'advantages' and 'disadvantages', 'pros' and 'cons', or 'benefits' and 'costs'. Further, we shall leave it to the individual to define what he or she means by gains and losses. In particular, they need not be gains and losses to the individual in question. They could already embody some degree of 'altruism' — concern for others. Next, we shall produce a second definition: 'society' is nothing more than the collection of individuals who make it up. There is to be no concern with entities such as the 'state', in

the sense that shall not regard the 'state' or 'society' as being something *in addition to* the sum of people who comprise it.

CBA is a procedure for:

1. measuring the gains and losses to individuals, using money as the measuring rod of those gains and losses
2. aggregating the money valuations of the gains and losses of individuals and expressing them as a net social gains or losses.

Given the definitions of 'rationality' and 'society', we can therefore say that a rational *social decision* is one in which the benefits to society (i.e. the sum of the people in society) exceed the costs. Note that use of the term 'rational' seems a little emotive. Few of us would like to think we are not rational in our choices. But rationality and morality are not at all the same thing. Judging that action *X* will give me more benefits than costs and choosing *X* as a result is not the same thing as saying that *X* is a 'morally correct' action. By depriving, say, a major charity of money I could otherwise have given it, my choice may seem distinctly morally unacceptable to others. In the same way, the summation of a whole set of choices by many individuals may give a result which the 'state' or government thinks is not right. As a procedure for aggregating the preferences of our set of individuals, we can establish something of fundamental importance at the outset: *CBA makes no claim to produce morally correct decisions.*

What CBA produces, and what is morally correct, may coincide if, and only if, we adopt a further rule, namely that some aggregated set of preferences of individuals is the morally correct way of making decisions. In some circumstances the two may well coincide. In others, government will often reserve the right to 'overrule' group preferences. In still others, and these are surely the majority, governments will at least wish to know what the preferences of the individuals who make up society are. It is in this sense that CBA is an 'input', an 'aid', an 'ingredient' of decision-making. It does not *supplant* political judgement.

Now, there can be no doubt that there are unscrupulous economists, along with unscrupulous politicians, philosophers and engineers. If, therefore, CBA has been exaggerated in terms of its role in decision-making, it may be that there are those who have not practised its tenets properly. Equally, we must investigate to see why it should be so easy to produce the kind of result that has clearly irritated and offended the likes of Self and Schumacher. Their worries arose, in particular, because of (a) the attempt to apply the market-place philosophy to non-market situations, and (b) their doubts about the values expressed in the market-place as a guide to anything that can be described as morally correct. These are familiar objections to CBA, and the two separate strands of concern are frequently confused. If (b) is correct, for example, and we cannot ascribe 'morality' to market-place evaluations, then the valuations obtained by using the same procedures in contexts where there are no (obvious) markets must also be immoral. But objection (a) could still be made while (b) is regarded as morally acceptable. In this case, we are more likely to be arguing that things not traded in markets are, in some sense, 'special' and hence not open to valuation in money terms. Or it could be that the objection is a practical one as to whether the specific techniques used really are capturing the 'full' value in the non-market situation.

Value judgements and CBA

We have argued that CBA is a technique, as yet undefined, for aggregating the preferences of individuals. CBA makes no claim to be morally binding, for the simple reason that what is moral need not coincide with what people want. That should be sufficient to establish the role of CBA. It does not make political judgement redundant because there is no *necessary* relationship between those judgements and the wants of individuals. (We shall not investigate the issue of how political judgements relate to moral judgements!) Notice that this

already removes some part of the objections raised by Self and Schumacher, for it is odd to speak of deceiving the people whose valuations make up the result obtained by the CBA. If the objection is that CBA does not *in practice* reflect individuals' valuations, that is a quite different objection and one that raises a much larger area of concern about how we 'test' for the accuracy of any results. We return to that issue later.

In what way, then, does CBA seek to aggregate individual preferences? It does this by taking the market-place as the prime context in which those preferences are expressed. The medium through which they are expressed is money. It is important to realise the reason for this. It has nothing to do with being obsessed with money, and everything to do with the *fact* that markets are the *only* contexts in which individuals express millions of preferences daily. The political system does not begin to compare. We would have to have endless referendums and elections to get remotely near the complexity of the market-place, whether it be the local fish market, the Stock Exchange or something as complex as the foreign exchange market comprising the world's financial institutions and a very large number of telephones, telex machines and computer display units.

Within these markets countless individuals express their preferences *for* or *against* goods and services. They vote for them by buying them and against them by not buying them. The means that they use to express their votes is, of course, money. Those votes could be expressed in terms of any measuring-rod. It so happens that money has evolved as a convenient measuring-rod. Had it been cowrie shells or camel bells they would still have been 'money', which is simply a word for the medium of exchange. In this respect there can be no objection to a technique which seeks to elicit preferences expressed in terms of money. If that remains an objection, we must surely conclude that the critic has not understood at all the evolution of economies. But that cannot be what worried Self and Schumacher. We get a little closer when we consider that money is a medium of exchange *and* a

store of value in terms of income and wealth. What this means is that the preferences expressed in the market-place are conditional on the possession of money. That is, those preferences will be weighted by the market power conferred on individuals through their possession of money. This is part of what Schumacher means when he refers to the 'pretence' that 'money is the highest of all values'. As we shall see, there are ways of adjusting our CBA for this kind of concern, but for the moment we should pause to see what our analysis has revealed.

First, it is evident that CBA involves the aggregation of individuals' assessments of the costs and benefits to them of a given action, policy, project or programme. This means that we have implicitly accepted that CBA results will, if properly derived, reflect individuals' preferences. If CBA is then an input to the procedure of deciding what a decision-maker ought to do, then CBA is itself 'normative' and rests on at least one value judgement or normative statement, namely that it is a good thing that individuals' preferences should count. Note that a normative judgement or statement *recommends* and implies that what is recommended is 'good'. While we can ask 'why' we should do something, it eventually becomes rather redundant to ask why something is good. Our views as to what is and what is not good will diverge.

Second, by looking at the role that money actually plays in the *measure* of preferences, we observed that market-places operate on the basis that those with more money have more say than those without. Note the contrast here with a political vote which, in an ideal world, is unrelated to income or wealth. If we are to leave the aggregated preferences in the market-place unadjusted, it follows that they will reflect the structure of market power, or, to put it another way, the distribution of income. If we are to afford CBA its role in the decision-making procedure, then, we must add a second value judgement, namely that the distribution of income used to weight the preferences of individuals is in some sense the best one. In short, the existing distribution is good. (Indeed, we have to go a little further and say it is the best.)

Now, the two normative judgements that emerge require restating. They are:

1. individual preferences should count
2. those preferences should be weighted by the existing distribution of income.

That individual preferences should count implies that social decision rules reflecting individual preferences are 'good' rules. This is appealing in that it obviously defines the basis of what we might call 'simple democracy'. Judgement (1) is thus the basic requirement of democratic sensitivity, or, as it is best known in economics, consumer sovereignty. What is morally appealing about (2)? Perhaps the existing distribution of income reflects the distribution of effort in the economy and we might invoke a principle that people deserve a 'proper' reward for their effort. Against this we might point out that the existing distribution of income already contains that reward; what we are arguing about is whether CBA should *also* reflect that distribution. After all, if CBA is used to guide decisions, this is tantamount to saying that those who have already been rewarded will be rewarded again. Obviously, the debate over (2) could go on, but one thing is clear. We do not have to accept (2) in its particular form as stated here. Equally, we cannot refuse to adopt *some* judgement such as (2). For example, if we reject (2) and say that all the preferences recorded will somehow be 'equalised' to net out the influence of market power, then we have rejected (2) in its stated form but have replaced it with a variant of (2). The only rule we seem to have for selecting one variant of (2) rather than another is its 'moral appeal'. CBA can be constructed in different ways according to whether we combine (1) with (2), or (1) with some variant of (2). But of course we could reject (1) on the grounds that individuals are poor judges of their gains and losses. This 'paternal' argument would then mean that we would have to substitute another set of preferences for (1), perhaps the preferences of some set of experts or those who have the final responsibility for decision-making. Now, if we accept this line of thought, what

happens to judgement (2)? We now have to replace that with some judgement to the effect that each expert's valuation is equally important or that there is some weighting of judgements (according to seniority, peer group review?).

We conclude that CBA requires TWO normative (value) judgements. The first states that preferences count, but requires careful qualification about WHOSE PREFERENCES are to count. The second must say how the preferences are to be weighted.

We are now in a position to make some brief, but important, observations.

First, there are two, and only two, forms of judgement required. This may be contrasted with the proliferation of value judgements suggested by some authors (e.g. Peacock, 1973).

Second, if we decide to adjust *either* value judgement we have not engaged in any underhand or illicit activity. There are no rules for choosing between ultimate value judgements. Choice is determined by 'moral appeal'. Appeals to the existence of 'virtual constitutions' (Mishan, 1974) cannot be more than this.

Third, CBA is a normative procedure. Not only is this *not* a limitation, it actually reflects the nature of economics itself and, some would say, *all* science (Katouzian, 1980). A frequent charge against CBA is that it is 'subjective'. This is a confusion. As value judgement (1) indicates, it is the subjective preferences of individuals that we are seeking. In that trivial sense it is indeed 'subjective'. But if the criticism is meant to be that the analyst himself can influence the outcome in some arbitrary way, then we have to point out that there is always the scope for falsification in any analytical technique, but that scope is not part of the conceptual structure of CBA.

Fourth, and following on from the earlier points, what value judgements *are* chosen must be made clear. If they are hidden in the analysis, then the charge of 'subjectivity' in practice will have substance. We can go further. Not only should the judgements be made clear, but the outcome of the

CBA should be recalculated to show the effects of changes in the value judgements. We should practise 'value judgement sensitivity analysis' (Nash, Pearce and Stanley, 1975).

Money, preferences and 'non-markets'

So far, then, we have established, in outline form, the philosophical basis of CBA. In so doing we would argue that we have revealed some sources of misunderstanding in the quotations given at the outset. And in so far as the objection to the use of the measuring-rod of money is based on money as income or wealth, we shall see later how it is possible to adjust for that objection. But the quotations also indicate a concern about extending the measurement of preferences to so-called 'non-market situations'. We need to dwell on this issue briefly.

The preferences expressed in markets are revealed as offers of money in exchange for some benefit received. The bid made by the buyer of the benefit shows up as a willingness to pay for the benefit, conditional on his ability to pay (income or wealth). But what is *actually* paid could well be less than this willingness to pay. It cannot be more because then the individual will simply record a preference against the good or service: he will not buy it. But given that the actual price paid is determined by the interaction of many buyers and a few or many sellers, there will be individuals whose willingness to pay exceeds the price they actually pay. As we shall see, this excess of willingness to pay (WTP) over price is *consumer surplus*. Since the sum of money actually paid involves a loss for the individual, then that loss is the 'cost' of the purchase. We have a basic element of CBA in this simple example, for we can write, *for the individual*:

$$\text{WTP} = \text{Price paid}$$

$$\text{Individual's net benefit} = \text{Consumer surplus}$$

We shall return to this formulation when we look at the measurement of benefits.

Now apply this procedure to a situation in which there is no obvious market in the good or service. To find the net benefit to any individual of a non-marketed benefit such as peace and quiet, clean air, visual amenity, the preservation of wildlife, and so on, we need to find WTP and price, but since there is no market there is no set of actual transactions to provide us with price. The price, in fact, is zero. Indeed, this is just how we refer to these types of benefits. They are 'unpriced' or 'zero-priced'. But note that this is entirely different from saying that WTP is zero. Indeed, it needs only a moment's reflection to indicate that all the benefits we have listed have a *positive* WTP. That is, if there were a market, individuals would be willing to pay for the benefits obtained.

In fact, the reference often made to 'unmarketed' goods is slightly misleading. There are no markets in the goods or services as such, but there are often markets in other goods or services which are influenced by the valuations placed on the benefits of the unmarketed goods. These are *surrogate markets*. Two examples will suffice. First, while we have no obvious market in peace and quiet, we do have a housing market. If people buy and sell houses and are influenced by the extent to which a specific property is in a quiet location or not, then we should be able to observe the workings of the housing market and see if it 'reveals' the WTP for peace and quiet. As a second example, consider the highly emotive issue of the 'value of human life'. Resistant though many of us might be to the idea of valuing life, it is clear that individuals often do accept sums of money in return for an increase in the *risk* of death. One example might be premia added to wages for working in a dangerous occupation. Notice that it is not 'life' itself that is being valued by these premia, but the risk associated with the extra danger. Note also that this is not an example of WTP but rather 'willingness to accept' for the increased risk. Since the increased risk is the opposite of a benefit — i.e. a cost — this measure should strike us as accept-

able and consistent with the procedure so far developed. So, our first response to those who argue that there are 'no valuations' in certain kinds of goods and services must be to say that the absence of a direct market is not at all the same thing as the absence of an indirect market, and that the absence of a direct market does *not* mean that preferences and valuations are not made. If the logic of using market-place valuations is accepted, it is difficult to see how it can be rejected for surrogate markets.

This leaves us with goods and services whose values are not revealed in any market, obvious or surrogate. The value of a blue whale would seem to be a case in point. There is a commercial market in whales, but we would rightly reject the market price of the whale as oil and blubber as reflecting the aggregate of individuals' WTPs for the blue whale, for we know that there are many hundreds of thousands, perhaps millions, of people who value the whale in its natural state, even though they may only have seen one on their televisions, or in photographs. In such contexts we have two options. We can leave the issue 'unvalued' and say that we have no conceptual technique for working out the WTP for blue whales, or we can *invent* a market. To do this we can hypothesise a situation in which individuals vote for preservation of the blue whale and ask them what they *would* be willing to pay *if* there was a market in whales which was as open to them as it was to whalers. We can all envisage the practical difficulties, but for the moment we are concerned to know if the absence of an actual market reflecting all our valuations imposes any conceptual problem on our logic of finding WTP. It would seem not, and there are indeed a fair number of experiments in establishing such *hypothetical* or '*experimental*' markets.

How, then, does all this relate to the view that goods and services which do not have direct markets are somehow 'different' from other goods and services? For these goods to be so special that we cannot apply even the conceptual logic of CBA to them requires us to establish that any of the above means of calculating WTP would seriously mistate the true