

The principles of practical cost-benefit analysis

Robert Sugden and
Alan Williams

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Preface

Some explanation is perhaps required of authors who offer to the public 'another book on cost-benefit analysis'.

The distinguishing features of this book are implicit in its somewhat paradoxical title. Our aim is to offer a basic understanding of the *practice* of cost-benefit analysis. By this we do not mean that we have written a book of rules for decision-making; since the precise set of issues raised by any two decisions are seldom the same, any such exhaustive cook-book would inevitably be both extremely cumbersome and intellectually unsatisfactory. Nor are we presenting a description of the institutional framework within which public decisions are taken. Cost-benefit analysis is a way of organizing thought, a way of reasoning about decision-making. The structure of a book on the subject must be grounded in the logic of rational choice. But the cost-benefit analyst needs more than a firm grasp of a relatively few basic and extremely fruitful economic principles. He or she also needs the ability to apply these principles creatively to tackle practical problems. It is for this reason that we make constant use of illustrative examples and offer the reader a large number of problems to work through. Believing that a working understanding of cost-benefit analysis can be gained without venturing very far into the intricacies of theoretical welfare economics, we have resisted the temptation to explore the intellectual attractions of this territory. We believe that by limiting ourselves to the discussion of those economic principles that are directly relevant to the practice of cost-benefit analysis we have written a book that is accessible to people without formal training in economics, but with a working interest in the subject.

This book is composed of five interwoven strands:

1. *The central text* This forms the core of the book (and is set in larger type than the rest). This core provides a self-contained exposition of the fundamental principles of cost-benefit analysis. The simpler and more familiar concepts of financial appraisal are used as a starting-point; from this beginning the additional problems of cost-benefit analysis are introduced progressively. Although the level of difficulty increases as the book progresses, at no point do we use any but the most elementary mathematics nor do we assume familiarity with economic theory. Wherever possible, examples are used to aid the exposition. Particular attention is given to those issues that are of

central importance to practical cost-benefit analysis; the use of shadow prices, the use of consumers' surplus measurements, and the problems of valuing goods that do not have market prices, all receive extensive treatment. In contrast we avoid protracted discussion of the finer points of theoretical welfare economics when these do not have immediate practical relevance. We also have little to say about the problems of finding and interpreting the statistical data on which any cost-benefit analysis must rest. Our emphasis is on the process of economic reasoning that lies at the heart of a cost-benefit analysis.

2. *Examples* Interspersed among sections of the central text are sections devoted to the discussion of particular applications of the basic principles of financial appraisal and cost-benefit analysis. These examples illustrate some of the ways in which theory can be put into practice.

3. *Problems* At the end of many of the chapters are problems for the reader to tackle for himself or herself. These problems require the application of the principles expounded in the preceding chapters. Typically, something more is called for than mechanical manipulation of numbers according to closely defined 'rules'; some degree of creative thinking is necessary too. (It should perhaps be said of both the problems and the examples that, where numerical information is given, this is designed so that the conceptual issues being illustrated emerge as clearly as possible. Consequently this 'information' should not be taken to be more than, at most, a highly stylized representation of reality; it is the *issues* raised that are realistic.) Suggested solutions to the problems are given in Appendix 2 at the end of the book. The reader is advised to read the 'Notes on the Problems' in that appendix before tackling the problems.

4. *Appendices to chapters* The exposition in the central text is designed to be accessible to those without a formal training in economics. This means that it is not possible to relate very explicitly the principles of cost-benefit analysis to the more general principles of economics from which they derive. To fill this gap we have included a number of more 'technical' appendices. These do not introduce important additional principles, but rather give a more formal and general treatment of ideas already expounded informally. We believe that these will be useful to economics-trained readers, but other readers will lose little of practical significance by omitting them.

5. *Guides to further reading* At the end of each chapter (except the first) is a brief guide to further reading. References are made both to practical applications of the principles discussed in the

chapter and to technical literature dealing with particular points of theory in more detail. The former references should be of interest to all readers; the latter, for the most part, are likely to prove impenetrable for the non-economist.

Acknowledgements

I should like to take this opportunity to acknowledge my great debts to all those who have been my teachers, from my school-days onwards. I owe a special debt of this kind to my co-author Alan Williams, since it was he who, when I was one of his undergraduate students, first aroused and encouraged my interest in cost-benefit analysis. I should like also to thank all those colleagues and students at York, other friends and my family, in arguments with whom many of the ideas which appear in this book were developed.

Particular thanks are due to Gordon DeWolf, David Henderson and Charles Normand, each of whom read through complete drafts of this book and suggested improvements, and to Rita Harrison for her typing.

Robert Sugden

This book arose out of an idea which I discussed several times with Robert Sugden, and which he was happy to take up, develop, and put into effect in a lucid, rigorous and dedicated manner which I cannot fail to admire. He used me as a sounding board as the work grew, and reacted sensitively and responsively when my points seemed to him sensible, and charitably ignored the others. He therefore considers that I should be regarded as the joint author of the book, even though he has written it.

Alan Williams

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Part I: The Framework

1. The Framework

1.1. Project appraisal

This book is about the appraisal of projects. A *project*, broadly defined, is a way of using resources; a decision between undertaking and not undertaking a project is a choice between alternative ways of using resources. *Project appraisal* is a process of investigation and reasoning designed to assist a decision-maker to reach an informed and rational choice.

In this book we shall be concerned mainly with *public* choices. That is, we shall be concerned with choices that are made within organizations that are expected to act in the public interest. Such organizations we shall call *public agencies* or sometimes simply *the government*. Any person or group that is entrusted with a choice about the activities of a public agency will, for simplicity in exposition, be called *the decision-maker*. This noun is singular (and male) only for convenience; it is to be read as including the possibility that choices may be made by groups of individuals acting collectively in committees.

In the course of this book we shall discuss a wide range of choice problems of the kinds typically faced by public decision-makers. Where should a new hospital be located? Should a branch-line railway service be closed? Should more places be provided for workers to be retrained at the taxpayers' expense? And so on. The choices that we shall discuss are all, to a lesser or greater extent, complex. Even if the decision-maker is completely clear in his own mind about the ends that he should pursue—that is, he has an explicit *objective*—and even if he is well-informed about the courses of action between which he is to choose, it is assumed that it is still not immediately obvious which course of action he should select. Only by a process of reasoning can he work out which option is most consistent with his objective. It is this process of reasoning that forms the main subject-matter of this book.

We shall find it convenient to talk as if the act of taking a decision has been separated from the the task of reasoning which course of action is most consistent with the decision-maker's objective. We shall talk as if the latter task has been assigned to someone called *the analyst*. We shall adopt the convention of making the analyst singular and male and a different person from the decision-maker. The analyst's role is that of 'technical' or 'professional' adviser to the decision-maker. This book will be primarily concerned with the role

of the analyst. But it should always be remembered that this stylization of the roles of decision-maker and analyst is a matter of convenience in exposition, and nothing more. The task of advising a public decision-maker might in practice be given to a group of people rather than to a single individual. Or the decision-maker might not call for advice at all, but reason through a problem for himself—in which case he would be acting as his own analyst. Or someone with the technical skills of our analyst might be asked to take on some of the functions of the decision-maker—for example, by making a recommendation based on his own judgements of what objective his agency ought to pursue. Finally, it should be said that the analyst need not be a full-time professional economist; an engineer, for example, might simultaneously give advice both on the feasibility of a project and on its consistency with the decision-maker's objectives. Much more could be said about the relationships between the roles of decision-maker and analyst, but at this stage it would be premature. We shall return to this subject in Chapter 16 when some of these relationships will be discussed further.

Although interesting and relevant, it is not our purpose to *describe* the organizational structures within which public decisions are taken. We address ourselves instead to the intellectual and analytical dimension of choice. The analytical problems of choosing from a set of alternatives by reference to a stated objective are in many important ways independent of the institution within which the chooser works. The problems that we shall pass on to our analyst are problems that must be faced, in some way or another, by some person or other, whenever complex public decisions have to be taken.

1.2. Objectives

The starting-point for project appraisal must be a statement of the objective that is being pursued by the decision-maker. Rational choice is impossible unless the chooser knows what he is trying to achieve. This objective must be formulated in a way that is specific enough to allow it to be used as the basis of analysis. That is, the task of identifying which of the set of alternative courses of action is most consistent with the objective should, as far as possible, be a purely technical problem. To take an example, a public agency might claim that its objective was to pursue the public interest. But this does not advance matters very far, for there are many conflicting ways of interpreting 'the public interest' and beyond testing them for internal consistency no amount of analysis can show which of these rival interpretations ought to be preferred.

In some cases public decision-makers are given little discretion to set their agencies' objectives; the ends that they are to pursue are

clearly laid down, and the problem of selecting an objective for project appraisal is quite simple. In other instances, agencies are only given as guidance rather imprecise forms of words—such as ‘public interest’. Then the decision-maker has to choose how to interpret his instructions. In this book we shall consider a range of alternative objectives that a decision-maker might choose, or to be instructed, to pursue.

We shall begin (in Part II) by considering the most straightforward case, that of a financial objective. A financial objective is one that is formulated solely in terms of entities in an agency’s financial accounts. This type of objective is familiar in the context of the privately owned corporate firm, where the firm’s managers are paid to pursue the interests of its owners, the shareholders. Managers are expected to seek to maximize the flow of money income received over time by shareholders from the firm. (An alternative formulation is that the total value of the shares—that is, the shareholders’ wealth invested in the firm—should be maximized.)

There are many circumstances in which public agencies are expected to behave according to ‘business’ or ‘commercial’ principles—that is, to model their behaviour on that of private firms. The model of the private firm is applicable to public agencies only in relation to certain restricted types of decision; and the extent to which the model is applicable varies greatly between agencies. At one end of the spectrum are publicly owned corporations, like the British nationalized industries, which produce goods and services for sale. Such corporations have many similarities to privately owned firms. Although typically they are subject to various constraints imposed by the government in the public interest, they are generally expected to use commercial criteria for a wide range of decisions. At the other end of the spectrum are those agencies, such as police forces, which produce services that cannot be sold to consumers. Decisions about the level of provision of such services are necessarily taken on criteria other than the narrowly financial. But even such agencies as police forces take some decisions for which financial appraisal would be considered normal. A police force, for example, might have to choose between alternative methods of construction for its headquarters. Since (we may assume) the quality of the services provided by the police would not be directly affected by a decision between, say, brick and concrete construction, the decision might well be taken on the criterion of minimizing the financial costs, over time, of providing a particular quantity and quality of office space.

If we are to use the idea of ‘commercial criteria’ as the basis for project appraisal we must specify this idea more clearly. If the public agency is to model its behaviour on that of a private firm, the obvious