Executive summary

Imagine a choice between energy project options which involve investing in a coal-fired power plant or a renewable energy investment, such as in wind turbines. In choosing between these options (or deciding not to invest in either), one analytical tool that decision-makers and practitioners might reach for is cost-benefit analysis (CBA). This might start by understanding what these options provide in terms of benefits (defined as increases in human well-being) and costs (defined as reductions in human well-being). Although this may sound simple enough, some way must be found to aggregate environmental and social benefits and costs across different people (within a given geographical boundary) and finding some means of monetising these, accounting for different points in time. For one of these projects to qualify on cost-benefit grounds, its social benefits must exceed its social costs.

Environmental CBA is the application of CBA to projects or policies that have the deliberate aim of environmental improvement or actions that affect, in some way, the natural environment as an indirect consequence. In the past decade, there has been considerable expansion in the uses of CBA and in its policy and investment applications, yet uptake is not as widespread as it might be despite its ongoing usefulness for environmental policy and investment decision-making.

Key developments

- The contribution of climate economics: The attention devoted to estimates of the social cost of carbon emissions, despite being fraught with difficulties and uncertainties (e.g. in relation to climate sensitivity, future economic growth and emissions paths, and the damages that can be expected as a consequence) is underpinning progress in the fight against climate change. Work in this area has also increased the focus on how to value costs and benefits that occur far into the future, and shown that conventional procedures for establishing the social discount rate become problematic in an intergenerational context.
- The extension of valuation techniques to biodiversity and associated ecosystems: while much of this activity has been concerned with how to value ecosystem services, developments in techniques of non-market valuation remain front and centre. This is a good example of the prominence that non-market valuation continues to enjoy. There is considerable evidence of the use of environmental valuation in global and national ecosystem assessments.
- The extension of subjective well-being approaches and advances in established valuation techniques: subjective well-being valuation has opened up a new frontier for helping to monetise values for environmental impacts of policies and investment projects. Progress has also continued, for example, in approaches based on revealed behaviour in terms of extracting many (non-market) environmental goods and services implicitly traded in

markets by better establishing causal inference between the transaction for a market good (e.g. buying a house or accepting a job) and the implicit price of an (non-market) environmental good (e.g. air quality in a neighbourhood or the workplace). The influence of behavioural economics has also been useful in environmental economics, recasting what is known about valuation biases and response anomalies in approaches based on stated behaviour, as has been the rise of online surveys, enabling more extensive applications and further testing of biases and their resolution.

- The continued refinement of health valuation: Growing empirical record has enabled further progress in the realm of health valuation, for example via the use of meta-studies. This has established "reference values" for important categories of health impacts such as mortality risk that can be readily used in practical assessment. Increasing evidence of the global burden of disease, and especially the role of pollution as a determinant of this burden, has added a further urgency to this work.

Key findings

- A growing degree of technical sophistication on various elements of environmental CBA, such as stated preference valuation techniques, treatment of uncertainty and the use of discounting, has increased the statistical rigour and allowed for more robust and refined monetary valuation.
- Survey results point to substantial use of CBA across OECD countries in actual assessments of public policies and investment projects, but considerable further progress remains still to be made.
- Survey results also show that appraisal processes often downplay the role of CBA, and actual decisions are often made in a manner that seems to be inconsistent with CBA.

The policy process is characterised by a complicated set of institutions and it is important to place questions about actual use of CBA in that context. Understanding the political economy of CBA is crucial to understanding how it is actually used and what actions might be plausible to affect this in a positive way.

Interestingly, the sorts of institutional developments that might be proposed as part of this political economy approach are actually happening in the broader reform of regulatory frameworks across many national jurisdictions and supranational groupings of countries. The institutional architecture surrounding how environmental CBA is done (and when it is done) has involved the setting up of public (and often independent) bodies that could facilitate a more prominent role for CBA, for example by adding a further tier of scrutiny by in effect scrutinising or "peer-reviewing" official appraisals. The Regulatory Scrutiny Board of the European Commission is a prominent example of this.

Generally speaking, the role of environmental CBA is to act as the instrument to consider the case for (social) efficiency for decisions within the broader policy process. It is the primary objective of this book to assess recent advances in environmental CBA theory and to illustrate the practical use of CBA in policy formulation and in appraisal of investment projects.