

# Introduction: professionalizing benefit–cost analysis

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## 1 PRINCIPLES, STANDARDS AND PROFESSIONS

Many policy and economic analysts are familiar with benefit–cost analysis whether learned through formal courses or on-the-job training. These analyses are routinely developed at the federal level while many more are customized efforts at the federal, state, or local levels or in think tanks and academia. Various government agencies and the Executive Office of the President have taken time from mission-oriented tasks to develop BCA guidelines. Generally implicit in these guideline efforts is the goal of improving the quality of analysis. Within economics, the eminent economist Arnold Harberger called for a professionalization of BCA standards in the 1970s (Harberger, 1971).

However, professionalization, as it may involve aspects of licensing, quality signaling, or restricting entry, is not an automatically desirable practice to economists. A large literature exists on the role of professional licensing as a means to capture rents by limiting entry. Equally large is the literature on asymmetric information in which there is a concern that bad quality products will drive good quality ones from the market, for which one recommendation is a certification of quality. Organizational theory also points to the sometime role of professional identity in creating outstanding organizations, although economists have long considered and to date rejected a broad-based professional oath.

Our interest in developing principles and standards for benefit–cost analysis rests on the role of replication in science and the difficulty in discerning the quality of benefit–cost analyses. In our view it would be desirable if different analysts produced similar analyses when confronted with a common analytical problem; or, if those analyses differed, that they could be distinguished by readily communicated key differences. While this can be viewed as good science, it can also be viewed as good management of policy analyses. Similarly, although there is a frontier of analysis where new approaches are being used and tested, we view it as desirable that analyses that fail to apply

reasonably appropriate methods should be omitted from consideration. We believe that organizational efforts to identify principles and standards, even if they evolve over time, can assist in signaling quality in the contentious field of benefit–cost analysis. However, no professional organization has existed to develop and guide the evolution over time of principles and standards for benefit–cost analysis. Only time will tell if the recently created Society for Benefit–Cost Analysis will fill this gap, and if it achieves the membership and broad-based credibility of longer-standing professional organizations such as those for financial analysts or accountants. Consequently, beginning with a workshop at the US Government Accountability Office in the early 2000s and continuing through meetings at the University of Washington, the creation of the Society for Benefit–Cost Analysis and work coordinated through the Benefit–Cost Center at the Evans School for Public Policy at the University of Washington, these chapters are offered in the hopes of furthering principles and standards and the quality of decisions supported by benefit–cost analysis.

## 2 A SHORT HISTORY OF PRINCIPLES AND STANDARDS

Benefit–cost analysis (BCA) as currently practiced represents the culmination of more than a century of theoretical advances in economics as well as empirical improvements in the art of public policy decision-making. BCA is, at its core, an accounting framework used to evaluate the financial consequences of decisions. In this sense, it is similar to analyses that corporations conduct in order to evaluate investment decisions and calculations individuals make on a daily basis prior to engaging in an activity or making a purchase. However, BCA differs from these frameworks in two significant ways. First, the objective of BCA is to increase public welfare; this increases both the technical and political complexity of the exercise, because the definition of “public welfare” is elusive. Second, because BCA often encompasses non-market goods, such as the value of a recreational visit or wildlife viewing at a park, the required data are often not found in market transactions, and instead must be generated through resource-intensive surveys or other statistical analyses.

Formalized BCA was first employed in the USA for the analysis of US Army Corps of Engineers’ (hereafter “the Corps”) public works projects such as canals and dams. These projects required significant allocations of federal expenditures to selected states or regions; as such, there was a need to justify the choice of a particular project or site objectively.

Economic theorists also spurred the growth of BCA through exploration

of the concepts of efficiency and social welfare in public sector economic policy. BCA has thus developed as a means for welfare economists, policy analysts, and engineers to evaluate the effect(s) of economic policy and decision-making upon social welfare in order to inform policy decisions. Advances largely coalesced to foster widespread governmental application of BCA in the mid-twentieth century. In recent years BCA has been applied to the evaluation of social programs.

## 2.1 The Engineers

BCA in the United States primarily arose not through academic research, but out of a need to facilitate mutual accommodation in a political climate rife with distrust and disagreement (Porter, 1995). During the nineteenth century, the French were at the forefront of formalized attempts to develop analyses of public investments. Though US Treasury Secretary Albert Gallatin had advocated for the comparison of water project benefits and costs in 1808 (Hanley and Spash, 1993), American efforts to analyze public investments were usually ad hoc until the Corps, borrowing from the French model, entered the picture in the early twentieth century (Porter, 1995).

The Corps' use of BCA was motivated by a Congressional desire to allay conflict and build consensus. Attempting to better govern its own massive earmark spending on contentious water projects, Congress recognized the Corps as a relatively neutral and respected arbiter in federal water project controversies, and thus sought to use the prestige of the Corps to promote procedural regularity and give public evidence of fairness in project selection (*ibid.*). The subsequent passage of the Rivers and Harbors Act of 1902 mandated that the Board of Engineers for Rivers and Harbors, also established by the Act, certify water projects as beneficial (Hammond, 1966), as Congress evidently found the ideal of efficiency sufficient to serve as a coordinating principle to facilitate tractable decision-making and curb rampant spending. A later amendment to the Act in 1920 further required Corps-recommended projects to promise benefits in excess of costs (*ibid.*). Porter (1995) notes that this project approval process was not a mere formality: the Corps rejected more than half of proposed projects, usually on the basis of economic unfeasibility (*ibid.*).

Depression-era public works spending and ongoing flood concerns further spurred the application of BCA through the Flood Control Act of 1936. This Act stated that the Corps was to evaluate water resource project benefits and costs "to whomsoever they accrue" (Hanley and Spash, 1993). The Act allowed Congressional authorization only for projects that had been approved by the Corps. However, Porter (*ibid.*)

notes that the Act's explicit requirement for Corps approval on a BCA basis was already standard Corps practice. Though project approval methodology still left ample room for political influence and special interest legislation, Congressional passage of inefficient large public works bills was significantly curtailed; the Corps' economic analyses limited debate such that the approval of truly egregious projects became rarer (*ibid.*)

Initially, economic figures put forward by the Corps were accepted without reservation. However, the Flood Control Act had neglected to specify appropriate metrics for benefits and costs, which resulted in each federal agency developing criteria biased towards its own initiatives (Quade, 1971). Accordingly, rival techniques and standards for BCA were introduced. After 1940, this led to controversy regarding Corps decisions, as powerful interests including major utilities, railroads, and rival federal agencies (especially the Bureau of Reclamation and the Department of Agriculture) called various technical figures into question and pushed for rigorous standardization (Porter, 1995).

In 1945, four federal agencies—the Army Corps of Engineers, Federal Power Commission, Bureau of Reclamation, and Department of Agriculture (USDA)—commissioned a “subcommittee on costs and benefits” (N.A., 1945) in an attempt to resolve these differences by relying on basic economic principles. However, while the subcommittee's report served to clarify points of difference, such as project life and the degree of side-effect inclusion, they could not officially resolve different principles and standards as the committee lacked formal bargaining power to develop unilateral customary procedures (Porter, 1995). Thus, the committee largely left the task following their descriptive efforts, but a small USDA working group tasked by the subcommittee to prepare “an objective analysis of the problem” persisted (*ibid.*). In 1949, this working group distributed a report titled *Objective Analysis* (*ibid.*). However, this report, known colloquially as the *Green Book*, failed to reconcile benefit–cost practices and, while influential, did not gain official standing (Quade, 1971).

## **2.2 The Economists**

The modern economic basis for BCA builds on the early formalization (1844) of consumer surplus associated with Jules Dupuit, civil engineer and self-taught economist (Ekelund and Hébert, 1999), and Vilfredo Pareto's foundational study of the distribution of income and economic efficiency (1896). Theoretical advancement of Pareto's work in the 1930s rendered economists significant actors alongside engineers in the benefit–cost field. From Pareto's work comes the concept of a “Pareto improvement,” which

occurs when, as the result of an allocation change, at least one person is made better off and no person is made worse off. A second term, "Pareto efficiency," is a state that is attained when no further Pareto improvements are possible. There are two forms of Pareto efficiency. In its strong form, Pareto efficiency holds that state A is preferred to state B when state A is ranked higher than state B for one person and all other persons rank A at least as high as B. In its weaker form, the utility (well-being) of each individual must be higher in state A for state A to be preferred (Boadway and Bruce, 1984). In practice, the unanimity requirement of the Pareto efficiency criterion is paralyzing as an empirical decision-making tool as almost every policy decision engenders winners and losers. A more pragmatic substitute for the Pareto criterion, developed in light of this limitation, is the "Potential Pareto," or "Kaldor–Hicks," criterion.

The Kaldor–Hicks criterion arose during the late 1930s out of discussions among leading British economists about the adoption of the Corn Laws in 1815 and their repeal in 1846 (Harrod, 1938; Robbins, 1938; Hicks, 1939). Earlier economists had generally assumed that each individual had an "equal capacity for enjoyment," and that gains and losses among different individuals could be directly compared (Mishan, 1981; Hammond, 1985). For example, Harrod (1938) argued that the net social benefit from a policy could be established on the assumption that the individuals affected were equal in their capacity to enjoy income. By 1939, however, leading British economists began to question the validity of making interpersonal comparisons of utility as required for such policy prescriptions (Hicks, 1939). For instance, Hicks's contemporary Lionel Robbins wrote that interpersonal comparisons of utility could not rest on a scientific foundation since utility cannot be measured, and thus the justification for such comparisons is more ethical than scientific (1938). Nicholas Kaldor proffered a solution, acknowledging the inability of economists to establish a scientific basis for making interpersonal comparisons of utility, but suggesting that this difficulty could be rendered irrelevant (1939). Kaldor sought to avoid interpersonal utility comparisons by separating equity from efficiency, arguing that policies engendering an increase in aggregate real income are always desirable because given such a change the *potential* then exists to make everyone better off:

[T]he economist's case for the policy is quite unaffected by the question of the comparability of individual satisfaction, since in all such cases it is possible to make everybody better off than before, or at any rate to make some people better off without making anybody worse off. (Kaldor, 1939, pp. 549–50)

According to Kaldor's revised criterion of economic efficiency, a hypothetical project is desirable if the money measure of gains exceeds the

money measure of losses, since there is then the potential for a transfer between winners and losers that could satisfy the basic Pareto criterion. Using the change in aggregate gains as the measure of efficiency was thought to separate efficiency and distributional effects and thus avoid interpersonal utility comparisons (*ibid.*). Contemporary thinking held that only politicians (or at least non-economists) should make judgments and decisions about income distribution effects. Eager to separate considerations of efficiency from those of distribution so as to put economics on safe ground as an objective policy instrument, Kaldor noted that whether *actual* compensation should take place “is a political question on which the economist, qua economist, could hardly pronounce an opinion” (*ibid.*). He thus proposed that decision-makers address ethical values regarding equity outside the purview of BCA. Hicks, perhaps the most prominent economist of the time, accepted the Kaldor approach, which eventually became known as the Kaldor–Hicks (KH) criterion.

The KH criterion did not truly obviate concern about making interpersonal comparisons of utility, however. The KH assumption of equal marginal utility of income in fact embraces such comparisons in a very particular way, where all people are treated equally in terms of the value they place on changes in income. To address this, Kaldor endorsed the procedure adopted by Pigou (1920), which Kaldor describes as “dividing welfare effects into two parts: the first relating to production, and the second to distribution” (*ibid.*). Kaldor suggests, “the economist should not be concerned with prescriptions at all . . . For, it is quite impossible to decide on economic grounds what particular pattern of income-distribution maximizes social welfare” (*ibid.*). By taking this approach, BCA has been led to largely ignore the concept of moral sentiments as goods even though they may in fact fit the economic definition of goods, in that there is a willingness to pay for them.

In recent decades, BCA has continued to evolve in keeping with economic theory. Many of the current principles and standards identified in this project reflect this. For instance, growth in economic theory regarding the valuation of non-market goods and services has fostered increasingly comprehensive economic analyses. Valuation methods for non-market goods and services such as the travel-cost method (Hotelling, 1949), hedonic valuation (Rosen, 1974), and contingent valuation (CV) surveys (e.g., willingness to pay) (Mitchell and Carson, 1989) have increasingly gained acceptance as means by which to estimate values for non-market resources in the absence of observable market transactions. Current work regarding stated preference methods, both CV and conjoint analysis, is at the forefront of current BCA research and development. Other aspects of continued growth and discourse in BCA concern the use of appropriate

discount rates to account explicitly for distributional issues, and the treatment of uncertainty in producing estimates. Such refinement in economic methodology has enabled broader application of BCA to analyses of all types of government expenditures and regulatory activities.

Although the KH criterion remains the standard for BCA today, in recent years, it is of diminishing use in its restrictions. Analysts have lent increasing attention to ethical issues of distribution and intergenerational equity to the extent that KH has in practice been, if not abandoned, seriously eroded. Various approaches have been proposed to account for equity in BCA, including:

- distributional weighting, where net benefits, expressed in dollars, are weighted by income or some other metric to express an equity viewpoint (Brent, 1984; Farrow, 2011);
- using unweighted net benefits, but applying the KH criterion separately within each income class as well as in society as a whole (Ng, 1984; Farrow, 1998; Graham, 2008);
- using well-being rather than money as the metric, and employing a social welfare function that captures equity viewpoints (Adler, 2008);
- using benefits and costs expressed in dollars and measure willingness to pay for ethical sentiments to capture equity (Loomis, Chapter 9 this volume; Zerbe, 2001, 2007, 2009, and Chapter 8 this volume);
- taking a portfolio approach, whereby it is assumed that if a KH test is applied in multiple rule-makings, and that winners and losers are considerably mixed, then in the long run *most* (but not all) people will better off (Graham, 2008; Zerbe and Scott, 2012).

What is most commonly advocated though is for BCA to analyze equity issues qualitatively and separately from efficiency, by presenting policy-makers with the best distributional information possible and letting them weigh equity concerns implicitly (e.g., Jones-Lee, 1976). To date, this final approach is the most common practice throughout the world. Recent findings (e.g., Zerbe, 2007; Cai et al., 2010; Zerbe and Scott, 2012) call into question the validity of the long-assumed separation between equity and efficiency, however, so future principles and standards revisions are likely to revisit this issue.

### 2.3 Application to Broader Governance

The use of BCA in the USA at the federal level expanded beyond Army Corps applications in the 1960s, as former Defense Secretary Robert

McNamara instituted BCA within the Defense Department's Planning and Programming Budgeting System (PPBS) (Fuchs and Anderson, 1987). Though President Lyndon Johnson expanded the use of the PPBS throughout the executive branch in 1965, the program failed due to its complexity, difficulty in implementation, and lack of sustained presidential support. The program was officially terminated in 1971 (*ibid.*). Six years later, in an attempt to solidify executive branch control over federal regulatory agencies, President Richard Nixon included BCA in his "Quality of Life Review" process for agency regulations (*ibid.*). In a similar vein, numerous executive orders, regulatory commissions, and other executive actions pertaining to federal agency regulations undertaken by President Gerald Ford and President Jimmy Carter contain language referencing the weighing of benefits and costs to one degree or another (*ibid.*).

The use of BCA in federal decision-making was formalized beyond simply referencing benefits and costs in 1981, when President Reagan issued Executive Order (EO) 12291. Executive Order 12291 required that Regulatory Impact Analyses be conducted for major government initiatives (Reagan, 1981). As noted by Philip Shabecoff in a *New York Times* article on 7 November, 1981, "[President Reagan] transformed with a stroke of his pen what had been a useful economic tool into an imperative of federal decision making." Among other things, the executive order declared that: (1) regulatory action shall not be undertaken unless the potential benefits to society for the regulation outweigh the potential costs to society; (2) regulatory objectives shall be chosen to maximize the net benefits to society; (3) among alternative approaches to any given regulatory objective, the alternative involving the least net cost to society shall be chosen; and (4) agencies shall set regulatory priorities with the aim of maximizing the aggregate net benefits to society, taking into account the condition of the particular industries affected by regulations, the condition of the national economy, and other regulatory actions contemplated for the future (Reagan, 1981). As a result of this order, the Office of Information and Regulatory Affairs (OIRA) within the White House Office of Management and Budget (OMB) became the central clearinghouse for all substantive agency rule-making, at the time reviewing between 2000 and 3000 rules per year. President Reagan's subsequent EO 12498, issued in January 1985, furthered this commitment, requiring each federal agency to submit a regulatory plan to OMB discussing all significant current or proposed regulatory activity for yearly review (Reagan, 1985).

In 1993, President Clinton introduced EO 12866, at once revoking both EO 12291 and 12498 and establishing a new format for OIRA reviews. Order 12866, titled "Regulatory Planning and Review," sought

to promote four broad objectives: (1) to enhance planning and coordination with respect to both new and existing regulations; (2) to reaffirm the primary role of federal agencies in the regulatory decision-making process; (3) to restore the integrity and legitimacy of regulatory review and oversight; and (4) to make the process more accessible and open to the public (Clinton, 1993).

President Clinton's order stated that when making regulatory decisions, both qualitative and quantitative costs and benefits should be incorporated into an assessment of all alternatives, including the status quo, and that the alternative that maximizes net benefits should be clearly identified. Of particular relevance to this Principles and Standards project, EO 12866 established 12 prescriptive principles for adherence to the new regulatory philosophy. The EO specified that performance objectives of a chosen regulatory policy must be specified and that stakeholders significantly affected by a regulation must be consulted. Other sections within the EO reorganized the regulatory review structure (Section II), developed a planning mechanism (IV), and centralized regulatory review within OIRA (VI). Section III prescribed the litmus test for determining what regulatory decisions must be subject to these review standards, stating that any regulation action that is likely to "[h]ave an annual effect on the economy of \$100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities" qualifies as "significant regulatory action" (Clinton, 1993).

In compliance with EO 12866, OIRA organized an interagency review committee with representatives from every major federal regulatory agency to examine the state of the art for the economic analysis of regulatory action. Three years later, in 1996, the group released a "Best Practices" document detailing the appropriate standards and methodology under which to conduct analysis of significant regulatory action as mandated by Clinton's executive order (US OMB, 1996).

In 2003, the OMB under President George W. Bush issued Circular A-4 (US OMB, 2003), which details methods for identifying benefits and costs as well as informs agencies what should be included in a BCA. The document replaced the 1996 "Best Practices" publication and a subsequent guidance form issued in 2000 (US OMB, 2000). In Circular A-4, OMB refers to the combination of BCA and other information as "regulatory analysis." The document gives details regarding required aspects of a regulatory analysis, including a statement of need for a rule-making, an identification of regulatory alternatives, and an identification of benefits and costs. According to Circular A-4, regulatory analysis must also establish a baseline for the comparison and must separately describe the

“distributional effects” of each alternative (i.e., how both benefits and costs are distributed among sub-populations of particular concern) so that decision-makers can properly consider these distributional effects along with the effects on economic efficiency.

The George W. Bush administration also produced more formal guidelines for agencies conducting BCAs, focusing analysis on the calculation of net benefit. In 2002, EO 13258 installed “regulatory policy advisors” in place of the Vice President for duties related to regulatory oversight, OIRA, and regulatory conflict resolution (Bush, 2002). EO 13422, issued in January 2007, amended Clinton’s EO 12866 in five major ways:

1. it required that agencies identify the specific market failure or issue prompting regulation in writing;
2. it ordered agencies to designate a presidentially appointed intra-agency “regulatory policy officer” to control upcoming agency rule-making;
3. it required yearly estimates summing the cumulative benefits and costs of agency rules expected to reach publication in the coming year;
4. it expanded executive influence by broadening OIRA review to include significant guidance documents, defined as “agency statement[s] of general applicability and future effect, other than . . . regulatory action[s], that set forth a policy on a statutory, regulatory, or technical issue or an interpretation of a statutory or regulatory issue”;
5. it permitted agencies to use more formal rule-making procedures when warranted (Bush, 2007).

In January 2009, President Barack Obama issued EO 13497, which formally revoked EO 13258 and EO 12866 and installed an updated version of President Clinton’s EO 12866 (Obama, 2009a). The Obama Administration’s October 2009 Executive Order (13514), titled “Federal Leadership in Environmental, Energy, and Economic Performance” significantly addressed regulatory review and benefit–cost analysis. EO 13514 mandates retrospective BCA policy analysis through annual performance evaluation to enhance accountability and extend or expand projects that have net benefits and reassess or discontinue under-performing projects (Obama, 2009b).

In keeping with this emphasis, a December 2009 proposal submitted by the White House Council on Environmental Quality to the National Academy of Sciences (NAS) for review seeks to update federal principles and standards for water resources planning and decision-making. The document seeks to update and expand the established principles and guidelines in place for water resource projects, currently collected as the *Economic and Environmental Principles and Guidelines for Water and*

*Related Land Resources Implementation Studies* (US Water Resources Council, 1983). The proposed revisions aim to modernize national water resources development by increasing the role of science in decision-making, incorporating both monetary and non-monetary benefits in the calculation of net benefits, and ensuring the transparency of analyses and determinations. Further, the proposal seeks to expand the purview of the proposed revisions to encompass all federal agencies that undertake water resource projects, whereas current guidelines only pertain to the US Army Corps of Engineers, Bureau of Reclamation, Natural Resources Conservation Service, and the Tennessee Valley Authority. The National Research Council (2010) reviewed the proposal and identified a number of weaknesses in the revised guidelines while being supportive of the overall intent. This effort at honing trans-agency principles and standards for BCA represents a significant development in the effort to achieve standardization while also illustrating its many difficulties.

The President's Budget proposed for FY2011 (Obama, 2010) also affirmed a move to increasingly cohesive, sophisticated federal BCA.<sup>1</sup> While no specific principles and standards are outlined within the document, the Budget proposal informs the development of principles and standards by addressing the underlying goals and intent of future federal BCA. Within the "Analytical Perspectives: Performance and Management" section, the Budget proposal states that more sophisticated evaluation methods are required to answer fundamental questions about the social, economic, or environmental impact of programs and practices by isolating the effect of government action from other possible influencing factors (Obama, 2010). Agencies seeking funding are required to demonstrate that their 2011 funding priorities are based upon credible empirical evidence—or a plan to collect that evidence—and to identify impediments to rigorous program evaluation in their statutes or regulations so that these might be addressed going forward (ibid.). For instance, the document notes "The Administration . . . has made a concerted effort to increase investments in early childhood education and home-visiting programs that are backed by strong evidence—because rigorous evidence suggests that investments in those areas have especially high returns" and further calls for retrospective BCA analyses, noting: "Historically, evaluations have been an afterthought when programs are designed—and once programs have been in place for a while it can be hard to build a constituency for a rigorous evaluation" (ibid.).

While such comprehensive federal legislation requiring the broad use of a formal, standardized BCA framework has yet to be approved by Congress, the presence of BCA as standard practice in governmental decision-making is nonetheless apparent within various levels of

government. Since the initial expansion of BCA beyond the Army Corps, intra-agency application and development of BCA practices has mirrored Congressional and Executive Branch actions described above. Though space does not allow for a detailed discussion of each, the US Environmental Protection Agency, Department of Transportation, Federal Aviation Administration, Department of Homeland Security, Department of Justice, Department of Housing and Urban Development, Department of Education, and Department of Health and Human Services (to name several significant actors) have all developed internal guidelines and BCA protocols in response to the aforementioned executive orders and OMB circulars. However, there currently is no overarching framework of inter-agency principles and standards beyond general guidance as provided by OMB and the Executive Branch.

Momentum is building towards increasing standardization, largely precipitated at the agency level and by the Executive Branch. In a February 2009 Memorandum for the Heads of Executive Departments and Agencies (74 FR 5977), President Obama directed the head of OMB to prepare a comprehensive set of recommendations pertaining to regulatory review at the federal level. This call for input sought to examine the role of benefit–cost analysis and related distributional concerns, disclosure and transparency, in preparation for the coming issuance of an executive order on Federal Regulatory Review. These documents reveal interest in and impetus for the development of a comprehensive, coherent standardization of BCA for decision analysis and implementation. Likewise, as the proposed President's FY2011 Budget document notes, far beyond the desire for consistency and efficiency, there exists a public right to governmental accountability and a justified expectation for prudent allocation of scarce fiscal resources that increases the need for consistent, standardized BCA in practice (Obama, 2010). Currently, the most comprehensive set of guidelines for conducting BCA on government projects and regulation remain OMB Circulars A-94, "Guidelines and Discount rates for Benefit–Cost Analysis of Social Programs" (US OMB, 1992) and A-4 "Regulatory Analysis" (US OMB, 2003).

Although this national summary has focused on the USA, some other national governments and international organizations have their own guidance such as the UK (HM Treasury, 2008), the European Union (2008), Canada (Treasury Board, 2007), and the World Bank (1994). While there is no comparable set of standards or history of use of BCA in more local or regional governments, there is growing momentum to that end. For example, the State of Washington, through the Washington State Institute for Public Policy (WSIPP),<sup>2</sup> now performs analyses of significant new social programs, and many states have adopted regulatory review

policies (though of widely varying structure, scope, and impact). A report by the Institute for Policy Integrity<sup>3</sup> at the New York University Law School provides a detailed discussion of the regulatory review process on a state by state basis (Schwartz, 2010). In addition, there is growing interest in using BCA in non-governmental settings, such as non-profit human services agencies. It is our belief that these principles and standards should apply to these growing areas as well.

### 3 CRITICISMS OF BCA

Given the role of BCA in governmental decision-making and the significant implications of policy decisions informed by such analysis, it is hardly surprising that both the process and application have long come under scrutiny. As noted previously, criticism has often served as the impetus for the growth and honing of BCA as a discipline and tool. Present criticism might best be divided into two categories: (1) philosophical concerns, generally broad questions of ethics, morality, and BCA usage; and (2) economic/technical issues, usually more pointed critiques involving questions such as non-market valuation and discounting. However, a more significant division is without doubt the dichotomous perspectives of BCA that inform BCA critics and proponents; much criticism of BCA has little to do with BCA, but rather with ongoing questions regarding the usage of science and expertise in decision-making.

Much of the criticism directed towards the use of BCA tackles a straw-man: BCA as a mechanistic decision-making criterion. Conversely, its best proponents present and defend a method by which to provide knowledge and inform possible outcomes. This dichotomy is by no means unique to the discipline of BCA; rather, it is one example of the debate surrounding science in many forms and across many disciplines. Sarewitz (2004) writes that scientific inquiry is inherently and unavoidably subject to politicization in a controversial decision-making environment, and thus that “political controversies with technical underpinnings are not resolved by technical means” (ibid., p. 1). Fundamentally, most criticism of BCA stems from the pervasive and problematic notion that “science is a source of facts and theories about reality that can and should settle disputes and guide political action” (ibid., p. 386). Science of any discipline, including BCA, will not furnish a decision without direction as to policy goals or social mores. Yet agreement can sometimes be reached about the means to reach a decision, even if not about the decision itself.

The decision to use BCA is itself an ethical decision. The way in which it is used, however, can rest in considerable part on science. Concerns

of intergenerational equity, discounting, and distribution are in the end political or ethical questions with economic or scientific components. Certainly, the approach and rationale utilized for a BCA must be explicitly stated alongside the analysis. While decisions made by the analyst or policy-maker are open to critique, it is illogical to condemn BCA itself on such grounds. This point, consistently emphasized in current BCA publications and analysis (as reviewed in Zerbe, 2007), obviates much of the criticism levied at BCA; BCA is not a mechanistic decision-maker, and should not be viewed or presented as such. The proper use of BCA is to furnish information and predictions. Thus, in reality, much disagreement surrounding BCA reflects democratic deliberation regarding values and usage, and does not speak to the legitimacy of BCA in and of itself.

A second overarching criticism contends that BCA is not sufficiently inclusive, encompassing, or informed. As a blanket criticism, such contention is inappropriate given that BCA is fundamentally an application of deterministic modeling. BCA is applied to complex, interrelated social, political, economic, and ecological systems; complex systems theory holds such systems to be non-linear and intrinsically uncertain (von Bertalanffy, 1968; Costanza et al., 1993), inherently limiting the potential accuracy and holism of a BCA model relative to its real-world analog. This is, however, the case with any model. Thus, any particular BCA model represents a gross simplification of the real world, intended not to reflect reality in comprehensive detail, but rather to inform decision-making about the likely efficiency of alternative policies. The very premise of modeling, as famously quipped by Einstein, is “to be as simple as possible, but not too simple.” As such, BCA processes of system bounding, aggregation, and reduction are not and should not be expected to be wholly definitive and complete. Sarewitz (2004) similarly notes that more information often decreases consensus, as increased information provides an ever-larger pool out of which interested actors can strike differing positions on the history leading to current circumstances, on what is presently occurring, on what needs to be done, and on what the outcome(s) will be.

Certainly, the assumptions and choices made to facilitate a particular BCA might well neglect a crucial process or fail to reflect a key value, and thus appropriately garner criticism as poorly suited for its intended purpose. Criticizing a BCA for inappropriately or insufficiently representing reality in this capacity serves a crucial place in honing BCA principles and standards and increasing the utility of future analyses. However, such criticism fails to resonate when levied as an indictment of BCA more broadly; it is axiomatic that BCA *modeling* does not fully capture the breadth and depth of complex social-economic systems.

This is not to say that all criticisms of BCA are poorly founded; in

fact, discerning critics have and continue to drive constructive growth and development within the field. Zerbe (2007) provides a fuller, iterated treatment of specific points of contention regarding BCA. Perhaps the most trenchant criticisms are, first, recognition that the usage of KH and the potential compensation test (PCT) entails a value judgment in and of itself, even though the fundamental premise of practical welfare economists has been to avoid value judgments and interpersonal comparisons of utility in conducting analysis and making policy prescriptions (Chipman and Moore, 1978). Second, there is widespread criticism that BCA is missing important values. This criticism reflects the valuation structure and scheme of classic KH and PCT analysis, which does not fully reflect the values and goals we hold as individuals and a society, as it often neglects equity and other moral values (Zerbe, 2007).

Critics are correct in asserting that much past BCA work has failed to incorporate existing moral sentiment into the model and output (*ibid.*). Axiomatically, unless BCA includes values held for distributional effects and other “equity goods” (*ibid.*), then values will necessarily be missing. And it is missing values that lie at the heart of most legal and philosophical criticism of BCA as a technique. To address this, traditional KH criteria can be expanded to include all sentiments, the realization of which there is a willingness to pay (Zerbe, 2007, 2009; Scarborough and Bennett, 2012).

#### 4 SUMMARY OF THE VOLUME

The material in this book grew from the Principles and Standards project at the University of Washington funded by the John D. and Catherine T. MacArthur Foundation. White papers were commissioned on various subjects from leading experts and promising younger scholars in specific fields of applied benefit–cost analysis.

Each of the commissioned authors’ papers was subject to professional review by another scholar in the field, and comments were provided to the author. Following revisions, each commissioned paper was opened up to public comment through posting on the website of the Benefit–Cost Analysis Center. Through this site, readers could view and download these pieces of cutting-edge scholarship, and leave comments for the authors and the benefit–cost analysis community. Several of the papers have since appeared in the *Journal of Benefit–Cost Analysis* and are reprinted here, courtesy of DeGruyter, as they appeared in that journal. In addition to directly commissioned papers, two other papers were developed as part of the project. The first, by David Burgess, delved into the complexity of the discount rate. The second, by Richard Zerbe, focused on the ethical

foundation for benefit–cost analysis. The contributions of each of these papers are briefly summarized here.

Aidan Vining and David Weimer in Chapter 1 investigate issues in the application of benefit–cost analysis to social policy. Social policy includes a range of substantive policy areas including early childhood development, education, physical and mental health, juvenile justice, crime and corrections, housing, income support, and employment.

Because it is always valuable and important to understand the efficiency consequences of government interventions, including social policy interventions, there is no normative reason why these fundamental principles of BCA (and more generally welfare economics) should not apply to social policy. Therefore, they argue that *the standard principles of BCA should apply to social policy*. However, the application of BCA to social policy does raise a number of issues that deserve special attention in any effort to develop standards for benefit–cost analysts. The specific charge for the paper was to “address general considerations in conducting a BCA of social programs, the need for principles and standards for social programs and addiction in particular and point out any special problems facing those doing BCA in the field of addiction.”

How best to evaluate programs and policies that affect early childhood is Lynn Karoly’s topic in Chapter 2. She notes that while the BCAs of early childhood programs serve to make such investments more compelling, there are limitations in the current state of the art. Most importantly, there are a number of methodological choices required when implementing a BCA—from discount rates to shadow prices—and analysts typically do not follow a standardized approach. Moreover, there are a number of other challenges in applying the BCA approach to early childhood programs that further introduce potential differences in methodology. These challenges include the economic values attached to observed program outcomes, many of which do not have readily available economic values, and valuing potential benefits beyond the last observed outcomes. At present, most BCAs of early childhood programs provide proof of the principle that the economic returns can be positive for a given program, but they do not support decision-makers who may want to use the results to choose between alternative approaches to early intervention or to assess the difference in the economic returns obtained from investing in early childhood versus investing later in childhood or versus investing in some other type of social program.

Joseph Cook in Chapter 3 focuses on policies and programs for public health preparedness and pandemic mitigation (PHP/PM). These policies include the stockpiling and distribution of vaccines or antiviral drugs, disease surveillance networks, social distancing measures such as school

closures, and quarantines or border closures. The focus is primarily on pandemic influenza in the US context. Cost-effectiveness analysis is compared with the benefit–cost approach followed by specific issues that arise in the economic analysis of PHP/PM programs. These include: modeling the macroeconomic impacts of pandemic outbreaks; modeling the effects on households of school closure policies; uncertainty; discounting; disparate impacts and equity; valuing mortality risk; and health externalities. A supplementary appendix provides a literature review on economic analysis of policies and programs for PHP/PM.

John Lott in Chapter 4 investigates the trade-offs involved in analyzing crimes and criminal justice. These investigations follow questions such as: Are we spending enough on police? What are the levels of penalties for different crimes? Are there trade-offs between different types of penalties? For example, does greater reliance on criminal penalties reduce the reliance on reputational penalties? There are many possible alternative methods of deterring crime. Longer prison terms are just one option. There are also issues of increasing the probability of arrest or conviction for those who are arrested. There are also private actions that can deter crime, of which private reputations are one example. Others are putting locks on doors, car alarms, or people owning guns. Some of these actions involve possible externalities and Lott discusses how those externalities might be measured and evaluated. Though Lott views the range of possible estimates for many of these actions to be too large to definitively say whether the actions pass a benefit–cost test, that is not an unusual result. It is still useful to know what actions can be said to pay for themselves and which ones do not.

Scott Farrow and Kip Viscusi focus on public safety in Chapter 5. They seek to provide an initial compilation of proposed principles and standards for benefit–cost analysis of public safety policies. In their view, public safety issues cover a wide range of governmental activities in general categories such as security, physical safety, health, natural hazards, and consumption of goods. Fundamental to each component is the element of risk of a bad outcome, including risks arising from nature as well as those that are the result of actions of people. Typically, there are also decisions that affect one's exposure to the risk as well as possibilities to either alter the risk or its consequences, as through the purchase of insurance.

Farrow and Viscusi note that the different contexts for BCA are associated with different literatures, communities of practice, and outlets for publication. What is similar across the applications in public safety is that there is an element of risk involving a probability of some negative outcome. Attending to general concepts such as public danger and public risk provides an important clue to the principles and standards that may

be common across areas of public safety. Consequently, their chapter focuses on principles and standards for applying BCA where the unifying theme is that public safety is directed at reducing risk to the public. They develop a very modular approach to focus on specific principles and standards, which seems to point the way toward a process to reach agreement, or not, on the recommendations.

The challenges of general equilibrium analysis are investigated by Allen Klaiber and Kerry Smith in Chapter 6. They describe a conceptual framework for incorporating general equilibrium effects into benefit–cost analyses of social programs. To make the description tangible, Klaiber and Smith selected a specific example, the evaluation of reductions in the resources available for public primary education. They use a policy change that has been common in local public education due to the economic downturn—reductions in the teaching staff. To highlight the general equilibrium effects of exogenous reductions in the resources used to produce education and its effect on common measures of the quality of education, they use a locational sorting model applied to school districts in Maricopa County, AZ. Several of these districts experienced teacher cuts in the 2009–10 school year and these cuts were used to illustrate how the model would work. Their approach provides an illustration of how the general equilibrium effects influence our understanding of both the severity and distribution of changes in household well-being arising as a result of changes to local social programs.

David Burgess and Richard Zerbe in Chapter 7 discuss the challenging problem of the appropriate rate of discounting for the typical case when projects extend over a period of time. They review areas of concern in the literature such as: the effects of risk, displacement of private capital, the rate of time preference including whether rates should be hyperbolic, ethical issues such as evolving wealth and whether or not certain goods such as lives and health are special and should not be discounted. The authors proceed from the premise that the purpose of discounting is to select that rate that will lead to selection of projects that maximize net present values. They conclude that this will occur when the present value of benefits compensates for the capital forgone and the consumption displaced and so recommend using the social opportunity cost approach to the discount rate.

Richard Zerbe in Chapter 8 focuses on the ethical foundation for benefit–cost analysis, which so often stirs concerns among those opposed to benefit–cost analysis. His view is that properly conducted, BCA is an art form embodying elements of law, morality, judgment, and science. It is a method of structuring conversation and organizing knowledge. It is not a maxim, nor can it be acceptably reduced to mechanical objectivity. To

recognize BCA as partly reductionist is not to prove it is without value, or without the flexibility to adapt to change. As a method it is necessarily reductionist and reductionist sciences have proven to be very powerful. The test of a method is whether it is useful, and BCA undeniably has been useful, notwithstanding claims to the contrary. Zerbe briefly considers the benefit–cost principle, the considerations that lie behind it, and the criticisms that have been made of it in light of these considerations. In response to criticisms, and to establish what BCA is more clearly, he describes a version of BCA that he calls ethical benefit–cost analysis.

Distributional issues are an important implication of ethical considerations and John Loomis in Chapter 9 traces the methods of analyzing who gains and who loses. The distribution of benefits and costs is certainly important to politicians as well as economists, but of course for different reasons. Traditionally, few BCAs explicitly analyze or provide a detailed discussion of equity. Historically, when equity was discussed it was in the context of a policy-induced change in market prices, taxes or incomes, not changes in utility from publicly provided non-market goods like human health and environmental quality. Loomis addresses that gap in his chapter. After first reviewing the importance of including equity in BCA, and the metrics to quantify distributional concerns, two case studies illustrating how to empirically evaluate distributional effects of non-market goods are presented.

Lisa Robinson and James Hammitt in Chapter 10 investigate the paradigm-shaking impact of behavioral economics. As traditionally conducted, benefit–cost analysis is rooted in neoclassical welfare economics, which assumes that individuals act rationally and are primarily motivated by self-interest, making decisions that maximize their own well-being. Its conduct is now evolving to reflect recent work in behavioral economics, which integrates psychological aspects of decision-making. Robinson and Hammitt consider several implications for analyses of social programs. First, benefit–cost analysis often involves valuing non-market outcomes such as reductions in health and environmental risks. Behavioral research emphasizes the need to recognize that these values are affected by psychological as well as physical attributes. Second, benefit–cost analysis traditionally uses exponential discounting to reflect time preferences, while behavioral research suggests that individuals' discounting may be hyperbolic. However, steep near-term rates may largely reflect impulsive behavior and self-control problems. Third, behavioral research emphasizes the influence of social preferences on valuation. In addition to acting altruistically, individuals may act reciprocally to reward or punish others, or use the status of others as the baseline against which to assess their own well-being. Fourth, behavioral economics identifies factors that can help

develop valuation studies that provide well-informed, thoughtful preferences. Finally, while behavioral research has led some to argue for a more paternalistic approach to policy analysis, an alternative is to continue to focus on describing the preferences of those affected by the policy options while working to ensure that these preferences are based on knowledge and careful reflection. Benefit–cost analysis can be best viewed as a pragmatic framework for collecting, organizing, and evaluating relevant information.

The concluding chapter, Chapter 11, by Richard Zerbe, Tyler Blake Davis, Nancy Garland, and Tyler Scott both synthesizes and extends the earlier chapters. Their chapter is intended as a starting synthesis of detailed principles and standards for benefit–cost analysis in government and non-profit decision-making, with a particular emphasis on social programs. Foundational principles and details of almost 50 principles and standards are presented in the six categories of benefit and cost estimation, market extent, discounting, risk and uncertainty, equity and distribution, and presentation. References are provided in each section and an appendix provides a glossary of terms and abbreviations. The authors recognize that some principles and standards are contentious and all may need to adapt to future developments and advances in economics and benefit–cost analysis scholarship. Thus, the chapter is viewed as the beginning of a continuing endeavor but an important synthesis to conclude this volume.

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## NOTES

1. The proposals in the President's Budget are also discussed in OMB's 2010 *Report to Congress* on the benefits and costs of federal regulations. More generally, the OMB's annual *Reports to Congress* provide updated information on federal regulatory analyses and related concerns, including issues relevant to the conduct of BCA (see [http://www.whitehouse.gov/omb/inforeg\\_regpol\\_reports\\_congress/](http://www.whitehouse.gov/omb/inforeg_regpol_reports_congress/); accessed 3 October 2012).
2. <http://www.wsipp.wa.gov/>.
3. <http://policyintegrity.org/>.

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Cost Benefit Analysis (CBA) refers to a mathematical approach that helps in the comparison of the cost and expected benefits of two or more options or projects. Therefore, it helps an individual or an organization to determine which potential decision can make the most financial sense when it comes to investment. Also, it identifies the benefits associated with a particular investment and the involved costs and deducting the costs from the benefits. It is applied in various institutions such as software development, construction, education, healthcare, among other businesses. The relationship A cost-benefit analysis (CBA) is the process used to measure the benefits of a decision or taking action minus the costs associated with taking that action. A CBA involves measurable financial metrics such as revenue earned or costs saved as a result of the decision to pursue a project. A CBA can also include intangible benefits and costs or effects from a decision such as employee morale and customer satisfaction.

1:39. Cost-Benefit Analysis (CBA). Understanding Cost-Benefit Analysis. Before building a new plant or taking on a new project, prudent managers conduct a cost-benefit analysis to e An example of Cost-Benefit Analysis includes Cost-Benefit Ratio where suppose there are two projects where project one is incurring a total cost of \$8,000 and earning total benefits of \$ 12,000 whereas on the other hand project two is incurring costs of Rs. \$11,000 and earning benefits of \$ 20,000, therefore, by applying cost-benefit analysis the Cost-Benefit ratio of the first project is 1.5 ( $\$8,000 / \$12,000$ ) and the ratio of the second project is 1.81 ( $\$11,000 / \$20,000$ ) which means project two is feasible being having high cost-benefit ratio. The following examples of Cost-Benefit analysis pr Cost-benefit Analysis determines the value of costs and benefits in monetary terms and makes a viable comparison to evaluate whether the monetary decision is worthy or not. It is important to express all aspects of the project in the same unit if you are going to make a comparison. Understanding cost-benefit analysis. It is important to undertake a cost-benefit analysis before starting a new project to evaluate the probable cost and the revenues that an organization might generate. The analysis helps to evaluate the financial feasibility of the project and remember it is the outcome that deter