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A review of government Cost-Benefit Analysis guidelines

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Abstract

Governments in Australia and New Zealand have developed guidelines for public sector managers to conduct cost-benefit analysis. These guidelines, while developed with reference to each other, differ on some fundamental issues. Four major differences emerge from a review of these guidelines: the choice of discount rate, the treatment of qualitative costs and benefits, the way in which distributional considerations are to be taken into account, and the rule to use in selecting among options where benefits exceed costs. This review, by pointing out the major areas of difference, and how these relate to the literature, may help to open a dialog that will improve the quality of the guidelines, and the CBAs that flow from them.

A review of government Cost-Benefit Analysis guidelines

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The drive toward evidence-based policy-making (EBPM) has taken a number of turns. One of these is the development by government agencies of standards for designing, managing, conducting, and presenting projects that make use of evidence. Examples include the UK Government's *Magenta Book* on evaluation methodology (2011). Australian government agencies have similarly developed guidelines for the conduct of various kinds of analysis, such as the evaluation of health programs (Victorian Department of Health: www.health.vic.gov.au/healthpromotion/steps/evaluation.htm).

Government guidelines for conducting cost-benefit analysis (CBA) of policies and programs have existed for some time (Commonwealth of Australia, 1966). The current push for EBPM, however, has seen an elaboration of such guidelines. This paper examines these guidelines to assess the similarities, differences, and omissions that appear among them, supplemented by email correspondence with relevant central agency officers who provided further details of the operation of these guidelines.

The guidelines chosen for review are those generated by state and federal central agencies such as Treasuries and Departments of Finance. That is, the review does not include CBA guidelines for specific policy domains such as transport or health, which concentrate on very detailed issues relevant to those particular domains. This review, on the other hand, covers guidelines that apply across the particular jurisdiction, and are relevant to all policy domains.

The list of guidelines reviewed here are:

- Commonwealth of Australia, Department of Finance and Administration, 2006, *Handbook of Cost-Benefit Analysis*, Financial Management Reference Material no. 6.
- New South Wales Government, Treasury, 2007, *NSW Government Guidelines for Economic Appraisal,* Policy Paper TPP07-05.
- Queensland Government, Department of Infrastructure and Planning, *Cost Benefit Analysis.*
- Government of Western Australia, Department of Treasury and Finance, 2005, *Project Evaluation Guidelines*.
- Victorian Government, Department of Treasury and Finance, 2009, *Victorian Guide to Regulation*, Version 4, Appendix C.
- NZ Treasury, 2005, *Cost Benefit Analysis Primer*, Version 1.12.

In addition to these guidelines from Australia and New Zealand, I also review the UK Department of the Treasury, *The Green Book: Appraisal and Evaluation in Central Government* (2003). This has been an influential document that is cited widely by the Australian and New Zealand guidelines.

This review will not provide a detailed point-by-point comparison of these guidelines. On some issues, some guidelines provide detailed discussion where others are silent or provide only a summary discussion. For example, the NSW guidelines provide an extensive discussion for how options to be evaluated in a CBA are to be constructed. Similarly, some guidelines provide detailed instructions on particular valuation techniques, such as contingent valuation and hedonic pricing. These variations in emphasis are to be expected. Of more interest are the differences in approaches taken to fundamental aspects of CBA, and this review will concentrate on these.

Four major areas of difference emerge among the guidelines, and these are explored in the subsequent sections.

Discount rates

The most substantial difference among the guidelines is in the determination of discount rates. A discount rate is used in CBA to transform future consumption into present consumption equivalents. In practice this means transforming future dollar values into current dollar terms. Costs and benefits at different points in time can thereby be measured using the same 'currency' of present value. For example, a benefit that will flow in 2020 and valued at $1 million *at that date* needs to be revalued to find its equivalent worth in today's dollars. It is generally accepted that a dollar in the future is not worth as much as a dollar today (even after ignoring the effects of inflation). The discount rate is a measure of how much future values are 'penalised' by virtue of the fact that they are *future* values rather than current ones.

The guidelines under discussion generally restrict CBA to time horizons of 20-30 years or less, thereby avoiding issues of intergenerational equity (Dasgupta 2008). However, even within the 20-30 year timeframe, some fundamental issues arise in determining a discount rate (the following discussion proceeds on the basis of real rates rather than nominal rates, unless otherwise indicated). This partially reflects the ongoing debate in the literature regarding the conceptual basis for determining the discount rate (Harrison 2010). The government guidelines discuss some of these broader conceptual approaches to determining discount rates, which center on the distinction between the Social Rate of Time Preference approach (SRTP) and the Opportunity Cost of Capital (OCC) approach. The UK *Green Book* and the New Zealand Treasury's *Cost-Benefit Primer* represent the two extremes of these two positions.

The *Green Book* explicitly adopts the SRTP approach, which it defines as "the value society attaches to present, as opposed to future, consumption" (p. 97) and which produces a real discount rate of 3.5 per cent for projects of 30 years life or less (a lower rate is suggested for projects of longer duration). Similarly, while the Queensland guidelines do not explicitly advocate any particular approach, in correspondence with the author it was clarified that Queensland uses the social time preference rate, which translates to a *nominal* discount rate of 6%. The New Zealand guidelines (p. 27), after noting the SRTP approach, adopt the OCC approach, which they define as the rate of return that would be expected on some other typical proposal of equal risk. The Western Australian, NSW and Victorian guidelines all similarly adopt the OCC approach.

The Opportunity Cost of Capital approach implies that the discount rate will vary with trends in borrowing costs and the economic sector in which a project operates. This produces significant variation among the jurisdictions that adopt the OCC approach in how they arrive at a specific rate. This variation arises from whether specific elements are included in the calculation of the discount rate, and if so, how each element is to be measured.

1. *Long-term benchmark rate.* Most guidelines begin (and some end) with a long-term borrowing rate to set a 'baseline' rate. In NZ, for example, this is the 10-year government stock rate that is updated annually: <www.treasury.govt.nz/publications/guidance/planning/costbenefitanalysis/discountrates>. Similarly, Victoria adopts an average of the 10-year Commonwealth bond rate, with WA using the long-term state borrowing rate. The Commonwealth, on the other hand, explicitly does not prescribe a benchmark rate; the rate is under continuous review. This is the opposite of the NSW approach that emphatically rejects the use of market based rates to set a benchmark; NSW instead specifies a default rate of 7 per cent that is relatively fixed over time.

2. *Market rate movements and adjustments for sector differences*. We have noted that NSW does not vary its benchmark rate based on movements in market rates. The NSW guidelines are emphatic that in order for there to be consistency across sectors and across time, the fixed rate of 7 per cent should be used to discount in all sectors and across time. Other jurisdictions, however, make adjustments to their respective benchmark rates in line with market trends and the sector of the economy for which the CBA is conducted. NZ distinguishes between general purpose buildings, infrastructure, technology-related investments, and all other investments. The Commonwealth uses a "central" discount rate, with variation from year to year and project to project.[1] Similarly, the Western Australian Treasury Corporation sets the actual rate to be used for any given project in consultation with the relevant agency (although the WA Treasury has indicated that it is considering moving to a fixed rate).[2]

3. *Adjustment for risk*. Further differences in the determination of discount rates among the various guidelines arise with the treatment of risk. The NSW Treasury's *Economic Appraisal*, on the one hand, argues that a risk premium *should not* be added to the discount rate because there is no systematic time profile to the degree of risk (a detailed justification of this approach is provided in Bureau of Transport and Regional Economics 2005). Risk should be dealt with when calculating the value of costs and benefits, and sensitivity analysis used to assess the impact of different possible probability profiles on these values. Economy-wide or 'system-level' risk should not be added to the discount rate for uncertainties that extend beyond the calculation of specific costs and benefits. Similarly, the Victorian guidelines also use a risk-free rate, while the Commonwealth simply advises against the use of such a premium. On the other hand, the NZ, Queensland, and Western Australia guidelines all argue that a 'premium' be added to the discount rate to adjust for risk and uncertainty for events such as catastrophic floods or earthquakes (see Harrison (2010) for a more detailed argument in favor of adding a risk premium to the discount rate).

Table 1 summarises the different rates that the jurisdictions advise to be used at the end of 2012, and the conceptual basis upon which these rates are derived.

The disparity in the way that discount rates are conceptualised and operationalised has major practical ramifications. A project, for example, that is viable in one jurisdiction may not be viable if funded under another jurisdiction's guidelines. Comparison across time and across jurisdictions is difficult in light of these differences. This is highlighted by the fact that the 'extreme' lower end of the sensitivity analysis recommended by the NSW Treasury of 4 per cent is higher than the 'average' rate suggested by Victoria.

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[1] Correspondence with the author.

[2] Correspondence with the author. It is interesting that Dobes (2009: 66) points out similar differences across policy areas in the choice of discount rates: "Australian rail projects, for example, have traditionally been evaluated using a 7 per cent discount rate, while 4 per cent has been used for road projects, but the reasons for lost in the mists of time".

Table 1: Discount rates in use, 2012: Conceptual and operational rates

Jurisdiction	Conceptual basis	Discount rate	Sensitivity analysis
UK	SRTP	3.5% real	No range specified
Queensland	SRTP	6% nominal (approximately 3-3.5% real)	+/-0.5-1%
New Zealand[3]	OCC	8% default 6.5% for general purpose buildings, 8% for infrastructure, 9.5% for technology-related investments	No range specified
Commonwealth of Australia	OCC	7% real	+/-4%
New South Wales	OCC	7% real	+/-3%
Victoria	OCC	3.5% real	No range specified
Western Australia	OCC	7% nominal (approximately 4-4.5% real) plus risk premium	No range specified

Similar variation in both conceptual approaches and operational determination of discount rates has been observed across a range of countries. Zhuang et al (2007: 17), for example, surveyed countries to assess discount rates adopted. They found that wealthier countries adopt lower discount rates than poorer countries, and that discount rates for any given country tend to decline over time (for example, India's rate is 12%, and the UK's rate declined from 10% in 1969 to 3.5% in 2003). These trends are consistent with the view that the rate of time preference is affected by degrees of affluence; both individuals and societies are more 'patient' and willing to defer present consumption if they are already at a high standard of living. Thus one would expect to find such variation across countries at very different stages of development. It is hard to justify such variation, however, within a country such as Australia, which is much more homogenous with respect to income, at any given point in time.

Standing back from these details regarding discount rates set by Australian and New Zealand governments, one senses that there is a reluctance to arrive at rates that are 'too low'. Given the time profile of costs and benefits that characterises many projects, where costs tend to be incurred earlier in a project's life and benefits further down the track, higher discount rates lead to more conservative decisions, in that fewer projects will produce net benefits. The guidelines generally lead to discount rates of at least 7 per cent, tending to 'punish' the more distant benefits. They do this by adopting the OCC approach rather than the SRTP approach; the latter tends to lead to lower discount rates[4] (Zhuang et al 2007: 9), and by sometimes adding a risk premium. Quiggin (2007) argues that the use of high

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[3] In communication with the author NZ Treasury has suggested that in light of a significant recent drop in the risk-free rate a change in the set of discount rate is overdue.
[4] Abelson (2012) shows that the two approaches, even with different rates, should reach similar conclusions, if the rate is applied to both consumption gained and consumption *foregone*, when using the SRTP approach.

discount rates is adopted as a counterweight to the optimism bias that is perceived to overvalue the benefits of many projects; a case he describes of "being right for the wrong reasons".

Qualitative costs and benefits and the issue of MCA

Another area of major difference among the guidelines is how to deal with costs and benefits that cannot be quantified. These are sometimes referred to as 'intangibles'. There is no reason that the tangibility of a cost or benefit necessarily affects the ability to quantify, and possibly monetise, its value. Personal services, for example, are intangible by definition, but can easily be assigned a monetary value if they are services that can be purchased in a market.

A more appropriate term is 'qualitative' costs or benefits. Various guidelines provide a list of these, such as "time, comfort, environmental amenity and cultural amenity" (Victorian Treasury: 11). Even a superficial glance at these raises questions about their respective 'qualitativeness', especially when it is precisely some of these intangibles that are used elsewhere in the guides as illustrative examples of how to conduct a valuation, using techniques such as contingent valuation and hedonic pricing. It is not clear from the discussion of these intangibles whether they are intrinsically difficult or impossible to quantify, or simply difficult to quantify in particular contexts for specific methodological reasons such as a lack of data.

All the guidelines acknowledge that such 'intangibles' cannot be formally included in a CBA. But there are differing views on how these qualitative costs and benefits are to be incorporated into a final decision. There are three broad approaches to the treatment of these qualitative costs and benefits. The Victorian approach is to provide a 'narrative' discussion of these in terms of their overall impact (p. 11). Another approach, illustrated by the Commonwealth guidelines, is to provide a detailed listing of these costs and benefits, emphasising their respective significance.

A third method for dealing with these qualitative costs and benefits is to use a more structured approach such as multi-criteria analysis (MCA). MCA is a methodology for comparing options by scoring them against a set of pre-defined criteria, and then adjusting these scores by weights determined by the relative importance of these criteria to the final decision (Proctor 2009). The New Zealand guidelines explicitly recommend the use of MCA to handle non-quantifiable cost and benefits. Others, such as Queensland (p. 41) and NSW (p. 17 and 72), do not actually use the term 'multi-criteria analysis', but they describe the technique.

It is interesting that MCA should be suggested as a means for handling 'intangibles', given recent debates about its appropriateness for decision-making in the public sector. A number of commentators, such as Abelson (2012), Ergas (2009), and Dobes and Bennett (2009) have argued strongly against MCA in any form as a supplement or alternative to CBA. Their arguments centre on MCA's perceived subjectivity and arbitrariness in setting criteria, scoring options against those criteria, and in setting weights for these raw scores. This arbitrariness, they argue, lend MCA to abuse by special interests groups. Abelson (2009) also argues that by comparing options in terms of benefits or costs to individuals in the community, rather than in abstract terms such as 'urban consolidation', CBA is more precise and objective than MCA. Proponents of MCA conversely argue that the 'objectivity' of CBA is spurious and its application is mired in a sea of technical difficulties that limit its ability to arrive at monetary valuations. Sugden (2005) attempts to reconcile the two approaches and provides a framework that can exploit the strengths of each.

Dealing with equity/distributional issues

CBA, in its strictest form, deals with questions of equity and distribution in a specific way, according to the Kaldor/Hicks compensation principle. According to this principle, widely cited by the various guidelines, projects are worth pursuing if the net social benefit is positive, regardless of the particular distribution of costs or benefits among individuals and groups that make up society. A net social benefit ensures that the 'winners' (those receiving benefits accrued as a result of a project) can theoretically fully compensate the 'losers' and still incur a net benefit. This principle does not require the winners to *actually* compensate the losers; from a social perspective the existence of an overall net benefit is the important factor governing decision-making. To many critics of CBA, this is conceptually unsatisfactory; it does not accord with other notions of equity and fairness.

The government guidelines we review here differ in terms of how far other notions of equity are to be incorporated into the final decision. The New Zealand and NSW guidelines do not discuss equity or distributional issues at all, implicitly accepting the Kaldor/Hicks compensation principle. The UK, Commonwealth, Western Australia, and Victorian guidelines, on the other hand, discuss the Kaldor/Hicks principle explicitly and why they regard it as an inadequate basis for dealing with distributional issues. The main criticisms are the political 'reality' that confronts decision-makers, which obliges them to take into account distributional impacts based on factors such as ethnicity and geography, and also the assumption behind the Kaldor/Hicks principle that the marginal utility of money is uniform across the population.

The Western Australian and Queensland guidelines suggest that a Social Impact Analysis should handle distributional impacts, although the details of such an analysis are not very clear. The Victorian Treasury (p. 20) suggests that a CBA "explicitly assess" distributional effects, and that this be done along a number of dimensions of inequality, such as "regional and urban areas; rich and poor; different ethnic groups; different age groups; those living near a hazard versus those living a large distance away from it." However, there is little detail for how such impact assessment is to be undertaken.

The UK *Green Book* and the Commonwealth *Handbook* provide more detailed discussion and suggestions to incorporate distributional impacts, although they do so on only one dimension of inequality – income inequality. These guidelines argue that distributional weights be used to adjust monetary costs and benefits, according to the income groups to which they accrue. The UK *Green Book* suggests that distributional weights be determined by empirical estimates of the social welfare function that links personal utility to income. These estimates "suggest that as income is doubled, the marginal value of consumption is halved" (p. 93). The Commonwealth *Handbook*, on the other hand, argues for a more subjective determination of these distributional weights based on government policy objectives.[5]

The use of distributional weights to deal with equity issues in CBA has been criticised in the literature. For example, Frank (2000: 917) and Ergas (2009: 37) argue that issues of income inequality are best addressed through the welfare and tax systems, allowing governments to "employ unweighted willingness-to-pay measures without apology" (Frank 2000: 917). Frank advocates this position even if the result will be a mix of policy programs that cumulatively favor people on high income.

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[5] Another Commonwealth CBA guideline, the *Best Practice Regulation Handbook*, argues explicitly against any weighting of costs and benefits for equity (2007: 129).

Decision rule

The objective of CBA is to determine which option among a set of options with the same objective best achieves that objective. However, determining the standard to assess 'the best' raises some issues. To illustrate these issues, consider the following table, which provides hypothetical values for two mutually exclusive projects. The values are measured in current dollar real terms, after adjusting for risk.

Table 2: Comparisons of costs and benefits: Hypothetical example

Options	Costs	Benefits	Net Present Value	Benefit-Cost Ratio
A	$1M	$1.7M	$0.7M	70%
B	$5M	$7M	$2M	40%
C	$10M	$12M	$2M	20%

One decision rule (which all but the Western Australian guidelines agree to use) is to choose the option with the highest Net Present Value (NPV). In the table this would be Options B and C, each with a NPV of $2 million. These guidelines acknowledge that in circumstances where there is a budget constraint, especially on initial capital costs, the Benefit-Cost Ratio (BCR) would then be used to select Option B over Option C.

An alternative decision rule is to use the BCR as the primary decision rule, which would lead to the selection of Option A. The Western Australian guidelines adopt this approach on the basis that the NPV tends to favor larger projects. Interestingly, the Commonwealth rejects BCR for the converse reason that it is biased toward smaller projects.

Conclusion

The development of clear guidelines by Australian and New Zealand governments for conducting cost-benefit analysis is a major step in improving the quality of evidence-based policy making. At the very least they will provide consistency *within* a jurisdiction on the basic steps that must be followed in using CBAs. It would be interesting to see, as a suggestion for future research, the extent to which these guidelines have actually been followed.

While the development of these guidelines is to be applauded, the discrepancies among them over some fundamental issues raise serious concerns. We have discussed these discrepancies in light of some of the literature on the appropriate conduct of CBA, and found that on the issues of conceptualising and operationalising the discount rate; the way that qualitative costs and benefits are to be accounted for; the way in which distributional issues are to be handled; and the rule for making a final decision, some important differences exist.

As a consequence of this review, some cross-jurisdictional discussion ideally will develop to try to resolve some of these differences. At the very least, the separate guidelines should acknowledge these differences and argue the case for their respective positions in light of the positions taken by the others.

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