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Is it really possible to build a bridge between cost-benefit analysis and cost-effectiveness analysis?

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Abstract

Cost-benefit analysis (CBA) is a recognised as the economic evaluation technique that accords most with the underlying principles of standard welfare economic theory. However, due to problems associated with the technique, economists evaluating resources allocation decisions in health care have most often used cost-effective analysis (CEA), in which health benefits are expressed in non-monetary units. As a result, attempts have been made to build a welfare economic bridge between cost-benefit analysis (CBA) and cost-effectiveness analysis (CEA). In this paper, we develop these attempts and finds that, while assumptions can be made to facilitate a constant willingness-to-pay per unit of health outcome, these restrictions are highly unrealistic. We develop an impossibility theorem that shows it is not possible to link CBA and CEA if: (i) the axioms of expected utility theory hold; (ii) the quality-adjusted life-year (QALY) model is valid in a welfare economic sense; and (iii) illness affects the ability to enjoy consumption. We conclude that, within a welfare economic framework, it would be unwise to rely on a link between CBA and CEA in economic evaluations.

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1. Introduction

Welfare economists typically advocate the use of cost-benefit analysis (CBA) when evaluating public sector resource allocation decisions (see Mishan, 1988). Under CBA, the

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costs and benefits from any given programme are expressed in monetary units, and the sign of the net benefit across all affected individuals is used as the decision criterion. CBA aims to maximise aggregate welfare and is the only methodology that, at least in theory, provides information on the absolute benefit of different programmes. However, potential ethical and methodological problems in attaching a monetary value to non-market benefits (see Hausman, 1993) have led to the development of alternative methods for measuring benefits. In health economics, this has led to the development of cost-effectiveness analysis (CEA), in which health-related benefits are expressed in a single measure, such as gains in life years or quality-adjusted life-years (QALYs).¹ Indeed, CEA has been used in most economic evaluations of health care interventions (see Elixhauser et al., 1993).

In essence, CEA considers only health-related measures of benefit to be relevant. This has led Kenkel (1997) to conclude, “when we accept the methodology of welfare economics, we should use CBA, not CEA”. Nonetheless, this has not prevented economists from attempting to link CEA with CBA. Such a link would be appealing to many economists since the results from the ever-increasing number of CEAs could be interpreted within a standard welfare economic framework. Johannesson (1995) has argued that where CEA counts all societal costs and uses a cost-per-QALY threshold, it can be interpreted as a CBA since the threshold value can be used to translate the non-monetary benefits in CEA into monetary terms for CBA. To do this, there must be a constant Willingness-to-pay (WTP) per QALY. There have been two main attempts to set out the conditions under which this will hold.

First, Johannesson and Meltzer (1998) have claimed that an article by Pratt and Zeckhauser (1996, hereafter PZ) “provides the strongest theoretical evidence to date” for the use of a constant WTP-per-QALY figure. PZ’s model uses a veil of ignorance based on perfectly comparable utility functions. Here, linking CBA and CEA requires that the benefit (in utility terms) from a given health improvement is constant across all individuals, so that maximising expected benefits behind the veil necessarily maximises aggregate health. Section 2 considers the prospects for a CBA–CEA link within PZ’s framework and shows that highly restrictive and counter-intuitive assumptions are required. Second, Bleichrodt and Quiggin (1999) show the conditions under which life-cycle preferences are consistent with QALY maximisation. By arguing that individuals will consume the same amount in each period, they set out the conditions under which all individuals weigh their own QALYs equally, and so form a basis for CEA in welfare theoretic terms. Section 3 discusses the results obtained by Bleichrodt and Quiggin (1999) and argues that they do not in fact link the analyses, even when the conditions they set down are met.

In Section 4, we propose a general impossibility theorem for links between CBA and CEA and argue that, as things stand, the link must be based on unrealistic assumptions which either arbitrarily set key variables to be constant (as in Johannesson and Meltzer, 1998), or which rely on special cases that do not exist (as in Bleichrodt and Quiggin, 1999). The impossibility theorem shows the conditions that *any* link between CBA and CEA must

¹ We use the term CEA to represent analyses that express benefits in any health-related units, although the term cost-utility analysis is often used when information on quality of life is combined with information on length of life.

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