IAN J. BATEMAN AND ANDREW P. JONES

CONTRASTING CONVENTIONAL WITH MULTI-LEVEL MODELING APPROACHES TO META-ANALYSIS: EXPECTATION CONSISTENCY IN UK WOODLAND RECREATION VALUES*

1. INTRODUCTION

The past two decades have witnessed an increasing reliance upon benefit-cost analysis (BCA) as a tool for project appraisal and to inform decision making. In the UK, a typical example of this trend is provided by the 1995 Environment Act which brought into being the Environment Agency (EA) and imposed 'general duties' upon the Agency to take account of the costs and benefits arising from its policies (H.M. Government, 1995). For many agencies, particularly those which have explicitly environmental or public good responsibilities, the assessment of benefits necessitated by adopting BCA approaches has led to a growing interest in tools for the monetary valuation of preferences for environmental goods and services. Consequently, expressed preference methods such as contingent valuation (CV) and conjoint analysis (CA) together with revealed preference techniques such as hedonic pricing (HP) and individual and zonal travel cost (TC) have enjoyed an unprecedented increase in application. However, use of such methods raise theoretical, empirical and practical issues. At a theoretical level certain of these various techniques yield different measures of value. Furthermore, the validity of certain modes of application and analysis have been subject to criticism and are associated with recognized biases, exhibited as empirical regularities within the published literature. These issues place an onus upon the analyst to explain to decision makers the consequences of adopting certain study designs. However, from a decision perspective a further and pressing practical issue concerns the fact that individual applications incur both direct and time related costs. Consequently the proliferation of valuation studies has coincided with increased interest in the potential for benefit transfer.

Rosenberger and Loomis (2000) define benefit transfer as "the application of values and other information from a 'study' site with data to a 'policy' site with

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little or no data" (p1097). A number of approaches to undertaking transfers are available[1] including simple transfer of unadjusted point estimates, transfer of benefit demand functions and meta-analysis. As the simplest approaches cannot incorporate the characteristics of a given site within the transfer exercise, considerable attention is being given to the development of methods for transferring benefit demand functions (Loomis, 1992; Bergland et al., 1995; Loomis et al., 1995; Downing and Ozuna, 1996; Kirchhoff et al., 1997; Brouwer and Spaninks, 1999; Brouwer and Bateman, 2000). However, results are mixed with some studies reporting considerable success while others indicate abject failure. Given this and the empirical difficulties of such studies, a substantial literature has developed regarding the applications of meta-analysis techniques as a basis for benefit transfer.

Meta-analysis is the statistical analysis of the summary findings of prior empirical studies for the purpose of their integration (Glass, 1976; Wolf, 1986). Developed over the last thirty years, it has most commonly been applied in the fields of experimental medical treatment, psychotherapy, and education. Typically, these experiments took place in well-controlled circumstances with standard designs. Deviation from such specifications increases the problems with any cross-analysis (Glass et al., 1981)[2].

Despite problems, meta-analysis offers a transparent structure with which to understand underlying patterns of assumptions, relations and causalities, so permitting the derivation of useful generalizations (Hunter et al., 1982). It permits the extraction of general trend information from large datasets gleaned from numerous studies which would otherwise be difficult to summarize. In comparison with other benefit transfer techniques, Rosenberger and Loomis (2000) identify three advantages of adopting a meta-analysis approach: (i) it typically collates information from a greater number of studies, (ii) it is relatively straightforward to control for methodological differences between valuation source studies, (iii) benefit transfer is readily affected by setting explanatory variable values to those at the desired target site be it a previously surveyed, unsurveyed or just proposed (i.e. currently non-existent) site.

Table 1 extends reviews by Van den Bergh et al., (1997) and Smith and Pattanayak (2002) to provide a brief summary of meta-analysis studies in this area. As can be seen, while analyses have addressed a number of issues, the bulk of applications have been within the field of recreation benefits valuation.

The empirical applicability of meta analysis to any given context is determined by the number, quality and comparability of studies available to the researcher (Desvousges, et al., 1998). Here there is a difficult trade-off between the desire to expand analyses so as to enhance the applicability of results to different goods, provision changes, locations, contexts, etc., and the consequent increase in data demands which such expansions entail. For example, Rosenberger and Loomis (2000) consider a wide range of outdoor recreation activities (10 separate categories ranging from fishing to rock climbing to snowmobiling) across a very extensive area, the US and Canada. This analysis requires a large valuation dataset