Joint meta-analysis of values of time and demand elasticities

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Abstract
While a very large number of travel behaviour studies have been carried out in the UK over the past three decades, there have been few attempts at integrating this body of work in order to identify systematic patterns in model results and test the consistency of different estimates. The work reported in this paper extends previous meta-analysis of price elasticities (Wardman and Shires, 2004;) and values of time (Wardman, 2004) and analyses both types of data simultaneously.

Meta-analysis consists of a quantitative analysis of existing evidence to explain how the object of interest, such as the value of time or fare elasticity, varies across different studies. In one respect this type of analysis performs much the same function as a conventional literature review. The key difference is that it attempts to amass sufficient evidence to enable a valid statistical analysis of available evidence.

Whilst meta-analysis cannot examine behavioural relationships with the same level of detail as, say, an econometric investigation of travel demand data or disaggregate analysis of individuals' choices, it has produced valuable insights, especially where empirical evidence from individual studies is limited. Prime examples are how a valuation or demand elasticity varies over time, with GDP, geographically or according to the methodology and type of data used. Other examples include insights into the effect of distance, mode availability and journey purpose. Meta-analysis underpinned the UK Department for Transport's 2005 revision to official recommendations regarding the valuation of waiting time and how the value of time varies over time with GDP.

There have been a number of meta-analyses of empirical evidence in transport markets covering, for example, price elasticities (Kremers et al., 2002; Wardman and Shires, 2004; Hensher, 2008) and values of time (Wardman, 2004, Shires and de Jong, 2006). However, there has been no simultaneous treatment of studies aiming to estimate different parameter types.

This paper extends previous meta-analysis ((Wardman and Shires, 2004; Wardman, 2004) in the following ways:
o Previous value of time meta-analysis (Wardman, 2004) covering 171 British studies carried out between 1963 and 2000 will be updated and is expected to take the number of valuations considered from 1167 to over 1500.
o Previous fare elasticity meta-analysis (Wardman and Shires, 2004) covering 104 British studies from 1951 to 2002 will be updated and is expected to take the number of estimated values from 902 to over 1150. Car cost elasticities and time based elasticities were not previously covered and will be added to the elasticity data set. This is anticipated to add 200 observations.
Regression models relating the parameter(s) of interest to GDP, geographic region, transport mode, type of data etc., will be calibrated on the updated data sets and results compared with the previous meta-analyses. Given the longer time series, it is hoped that greater confidence can be placed in intertemporal variations in parameter estimates. Building on previous results new avenues will be explored, particularly by specifying more interactions between distance, purpose and mode.
At a second stage we will analyse the extent to which empirical evidence on different types of parameters is consistent with economic theory and the relationships we might expect to exist between
fare elasticities, time elasticities and values of time, such as those implied by the ratio-of-elasticities approach. This will be conducted at an aggregate level and, to the extent that the data support it, disaggregated by journey purpose and mode.

The updating of values of time and elasticities will make this the most extensive meta-analysis yet conducted, capable of providing a large number of insights into how these parameters vary. Results could also provide a 'forecasting tool' allowing values and elasticities to be adapted from other studies where there is little or no direct evidence available.