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The design and interpretation of freight stated preference experiments seeking to elicit behavioural valuations of journey attributes

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Abstract

This paper considers how best to establish user valuations of the benefits for freight traffic from reducing both scheduled journey times and the variability of actual journey times. It first looks at who receives these benefits and establishes a case for delving further. A theoretical discussion then shows that estimated 'values of time' are likely to be conflations of several different effects, most probably varying from study to study. Results are then given from a case study where special care was taken to separate out these effects. As an Adaptive Stated Preference method is used, arguments are presented that counter the suggestion that resulting estimates will necessarily be biased. The paper ends with some conclusions.

Keywords: Value of Time; Freight; Adaptive Stated Preference; Reliability

1. Introduction

The purpose of this paper is fourfold. Firstly, it is desired to set out a description of what user valuations we may wish to measure, relating to choices between options for moving freight. Secondly, some difficulties in measuring those quantities will be described. Thirdly, results from a case study involving freight movements in the UK will be presented both as an application of some of the points discussed and in order to add to the stock of knowledge in the public domain of the magnitudes of these valuations. Fourthly, the chosen case study survey methodology will be defended in order to enhance confidence in the presented results and begin a discussion of the merits of that methodology.

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2. Who benefits from investment in improving journey attributes for freight movements?

2.1. What attributes are of significant interest to freight shippers?

It is reasonable to assume that governmental bodies will wish, when making transport investment decisions, to take into account the views of users, particularly regarding how they value the benefits and disbenefits that may accrue to them. In the UK the results of a series of commercially confidential studies were summarised by NERA et al. (1997) in a report for the UK Office of the Rail Regulator (since renamed), and reproduced here as Table 1, which helps explain why most studies of freight attributes have focussed on reliability and scheduled journey time. de Jong et al. (2004) give a good overview of published results, but not all the presented estimates are directly comparable, for reasons that will be discussed later.

Because there are fairly small numbers of freight decision makers and freight movement contracts are usually confidential, it has proved almost impossible to use Revealed Preference to study freight in the UK. Conventional Stated Preference also has its limitations if interviews are required with high level decision makers in big companies. This has led to some use of Adaptive Stated Preference techniques, whereby the design changes within the experiment in reaction to responses (see Section 4). Both forms of Stated Preference have to defend themselves against the possibility that respondents will react to a journey improvement as though they were the only one to receive it, and so imagine they will gain a competitive advantage. In the case of a new road scheme, for instance, that will not be the case and so the real value of the improvement may be overestimated.

2.2. What are the benefits to society from reducing freight travel times and their variability?

This question is most easily answered by looking at its inverse, i.e. what are the disbenefits from increasing freight journey times and their variability. Firstly, all modes except pipelines have personnel accompanying the goods when in transit, so slowing down transits will increase wage costs, as will reduced reliability. Most often we think of lorry drivers' wages in this regard. Secondly, there may be vehicle related costs. More congested roads may cause lorries to use fuel less efficiently, and later completion of a journey may reduce the amount of work that lorry can do that day. Thirdly, over time some products deteriorate or become harder to handle. Perishable foods are an obvious example, but some powders and liquids will 'settle' or solidify and so become difficult to unload. Longer and/or less reliable journey times may therefore generate extra costs or diminish the value of the load. For valuable goods, inventory costs may also become important. Fourthly, a longer journey time will dictate either an earlier departure or a later arrival. Both may cause costs by requiring loading staff at inconvenient times. Starting out earlier might rush production and reduce production efficiency. Later arrivals might delay Just-In-Time production processes or lead to stock-outs on shop shelves. To maintain customer service levels a denser network of depots may be required, at greater cost.

The above discussion suggests that the matter of valuing freight travel time and travel time variability may be complex. In addition, there is the obvious link between travel time and its variability such that worries over

Table 1
Order of importance of freight transport attributes (excluding cost) when considering mode choice

	Rank
Reliability	1
Scheduled transit time	2
Flexibility (in departure time)	3
Control/tracking	4
Security	5
Ease of (un)loading	6
Environment	7
Damage	8
(Equipment) Availability	9

Source: NERA et al. (1997).