



Experience conditioning in commuter modal choice modelling – Does it make a difference?



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ABSTRACT

This paper investigates the impact of decision maker's experience on model elasticities and predicted market share, using data collected in Sydney on commuter mode choice. Usage frequency is used as a proxy for experience and two separate mode choice models are estimated – one with experience conditioning choice and one without. Key model outputs are compared and we find that differences in the value of travel time savings and model elasticities are very marked. This suggests that ignoring experience that one has with each alternative in their choice set may be a candidate source of error in travel demand forecasts. We develop a method to obtain the level of experience for use in application of choice models to increase their prediction power.

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1. Introduction

It is often suggested that real experience counts when making choices and that choice responses are likely to be different after an individual has experienced specific alternatives. This has links with the concerns over the reliability of revealed preference (RP) data obtained on alternatives that individuals have had little if any exposure to through use or consumption. If we had a way of identifying experience with each alternative in a choice set, constructed from RP data, might we obtain different estimates of key behavioural outputs such as willingness to pay and elasticity? What if we weighted each alternative associated with each observation by some measure of overt experience? A reason why this might be important is that accommodating experience might enable us to narrow the gap between forecast and observed demand for new infrastructure such as toll roads and public transport.

There is a view in practice that there is no substitute for real experience in guiding decisions, regardless of whether that experience was a good or a bad one. 'We learn by our experiences' is a catch cry that resonates in many situations of real life (see [Hoeffler and Ariely, 1999](#)); yet there is a somewhat limited consideration given to this position in the majority of travel choice modelling applications. The exceptions are in areas such as Advanced Travel Information Systems (e.g., [Ben-Elia et al., 2008](#)), and stated choice studies in which an experienced alternative (the status quo) is used as a reference point to add realism through anchoring (e.g., [Hess et al., 2008](#)).

In the context of commuting mode choice, this paper reasons and tests a proposition that exposure to an alternative through usage, especially repeat usage, might influence one's view about that alternative. If true, then this is likely to result in a set of model outputs that are different from what might be obtained from models where experience is not explicitly

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taken into account. One possibility is that experience may interact with modal attributes (such as time and cost), resulting in a different role of these attributes in influencing individual choices.

The main aim of this paper is to investigate the role that overt experience in using specific alternatives might play in the probability of each alternative being chosen, and to compare this with a situation where overt experience is not explicitly taken into account. Having tested the experience proposition, we suggest a way of predicting the level of experience in an *ex post* situation. This is necessary for the application of the experience-conditioned discrete choice model. The latter is as important as the former aim, since without a way to incorporate experience in the application of an estimated choice model, the ability to allow for experience is compromised.

We achieve both of these aims through two modelling exercises. First, we estimate a non-linear-in-parameter model of commuting mode choice in which usage frequency is used as a proxy for experience conditioning. Second, a Poisson model is fitted to identify systematic sources of variation in levels of experience among the sample. Outputs from this Poisson model are fed into the mode choice model in the application phase.

The paper is organised as follows. In the next section we review a number of studies from the non-transport literature (which has canvassed the experience topic most thoroughly) to provide a justification for the importance of recognising experience in decision making. We then set out the RP mode choice model form of interest that provides a way of assessing the role that experience might play. The data source is then summarised and the main empirical findings presented by comparing a mode choice model that does not explicitly account for experience with two models that condition the utility expression of the chosen and non-chosen alternatives on experience. Elasticities and willingness to pay estimates are then presented and discussed. We also take a close look at the relationship between previous use of each non-chosen mode using a Poisson regression count model, as a way of gaining an understanding of circumstances under which non-chosen alternatives have been used in the past, providing a feasible way of predicting an appropriate measure of experience in the future if it becomes an important feature of mode choice models. The main findings and contribution are summarised in the concluding section.

2. The broader literature on experience

The transport literature does acknowledge the important role of experience on preferences, using inertia and past behaviour as measures; however, accommodating experience in its various guises is commonly not included, especially in RP mode choice studies, the focus of this paper. One paper of special note is [Ben-Elia et al. \(2008\)](#) who investigate the role of advanced transportation information systems (ATIS) in the provision of information which may influence their route choices. Their results show that the effect of information is somewhat limited for experienced drivers who already have a good knowledge base of the possible travel conditions on the network. What is clear from this study is that experience does have a role to play in establishing the influence that specific attributes (in this case ATIS) have in choice making.

[Hau et al. \(2008\)](#) review the broader literature and conclude that there exists a systematic and large description–experience gap. [Woodruff et al. \(1983\)](#) are indicative of similar views, specifically suggesting in the marketing context that expectations should be replaced with experience-based norms as the standard for comparison of a brand's performance.

When looking for evidence outside the transport literature, a greater number of empirical studies have been undertaken to test the effect of experience on preferences, and we review a few of the studies that support the current empirical inquiry. Using a discrete choice experiment (DCE) and a probit model, [Neuman et al. \(2010\)](#) tested the hypothesis that preferences change as experience with the health care service for maternity-ward attributes is accumulated. The study found that experience changes preference patterns, and that the impact of experience on preferences varies by socio-demographics. However, the intensity of the experience was found to be insignificant as preferences of individuals who experienced the service multiple times are not significantly different from those of individuals who experienced only one service. In a similar vein, [Ryan and Ubach \(2003\)](#) used a discrete choice experiment to test the effect of previous experience on preferences for a new system of issuing repeat prescriptions. They divided patients/participants into two groups: one had experience with the new system (the intervention group) and one had no prior experience (the control group). It was found that the intervention group and the control group value the attributes associated with the new system differently, indicating that experience influences preferences. They concluded that if preferences change following experience, then maybe it is the preferences of those who have experienced the change that should be used in applied economics. This is because the preferences of those who have not experienced the new system or an alternative will change once they have some experience. This finding has an important implication for the transport literature in the way that the preferences of experienced users might be a better predictor of all users' demand for modes of transport in the future. Of course, this implication is meaningful only if it can be shown that exposure to alternatives through marketing campaigns tends to encourage individuals to try travel modes that they have very little or no prior experience with.

[Wirtz et al. \(2003\)](#) compared students' predicted (expected), on-line (real-time) and remembered (retrospective) spring-break experiences, as well as the influence of these factors on students' desire to take a similar holiday in the future. They show that the best (and only) predictor of participants' desire to repeat the break was remembered experience. Neither predicted nor on-line experience uniquely predicted participants' desire to repeat the experience in any of the three path analyses. They concluded that although on-line measures may be better than retrospective measures for approximating objective experience, retrospective measures may be superior for predicting individual choice. [Hertwig et al. \(2004\)](#) investigated

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