Omitted attributes in RRM models

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Motivation

Random Regret Minimization (RRM) models (Chorus 2010) are proposed as a counterpart of Random Utility Maximization (RUM) models. Since their recent introduction, they have been used to explain and predict a wide variety of choices within and beyond the transportation domain, such as departure time, route, mode-destination, activity, on-line dating, health-related and policy choices (see e.g. Chorus et al. 2014 for a recent review).

For various reasons, discrete choice models may be misspecified. A well-known example of model misspecification occurs when an attribute which is relevant for choice is omitted from the model (for instance, because the analyst is not aware of the attribute). In non-linear models, such as discrete choice models, the omission of a relevant attribute is likely to result in biased estimates (Wooldridge 2010), and may ultimately result in misleading modelling outcomes. In the context of linear-additive RUM models, the robustness of modelling outcomes towards the omission of a relevant attribute has been studied extensively (e.g. Lee 1982; Yatchew and Griliches 1985; Cramer 2005). In contrast, for its RRM counterpart very little is known currently about its robustness towards omitted attributes. The primary objective of this paper is to investigate the robustness of RRM modelling outcomes towards the omission of relevant attributes.

Methodological contribution

Notwithstanding the limited knowledge on omitted attributes in RRM models, following RUM modelling practices, Alternative Specific Constants (ASCs) are occasionally used in RRM models to account for the average effect of omitted attributes on the level of regret of an alternative (e.g. Hensher et al. 2011; Chorus et al. 2013). The methodological contribution of this paper is that it develops new insights on how unobserved regrets emerge in RRM models. Thereby, it sheds new light on the use and interpretation of ASCs in RRM models.

Empirical contribution

To develop insights on the robustness of RRM modelling outcomes towards omitted attributes, as well as to illustrate our theoretical findings regarding the use of ASCs in RRM models, we conducted a series of simulation experiments. Data sets were created in which the omitted attribute is uncorrelated as well as correlated with the model's observed attributes. Furthermore, acknowledging that in real life the true underlying decision rule is inherently unknown, the data sets were built by using both RRM and RUM data generating processes. In line with our theoretical expectations, our analyses show that ASCs are effective in capturing the effect of an

omitted attribute on regret. Furthermore, we find that RRM modelling results are somewhat more sensitive towards misspecification in terms of the omission of a relevant attribute than RUM modelling results. More specifically, all else equal we find that RRM parameter estimates are relatively more affected than RUM parameter estimates. Finally, as an additional insight, we find strong evidence that misspecification in terms of the underlying decision rule (RUM or RRM) results in substantial bias in terms of the ratios of parameter estimates as well as in the models' predicted choice probabilities.

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