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A comparison of alternative-specific and main-effects conjoint choice models

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Main-effects choice-based conjoint (CBC) designs consist of attributes that are common to all alternatives. Incorporating alternative-specific attributes leads to more complex alternative-specific designs (ASD), which however enable more realistic choice situations in CBC studies. To compare both design approaches, we created two CBC studies, main-effects and ASD, and split respondents randomly between them. The alternatives in both studies represented electric SUVs. In the ASD-CBC, prices were specific to each SUV model. In the main-effects CBC, prices varied freely between all electric SUV models. We initially expected that the main-effects conjoint choice model would perform worse, and would overestimate (underestimate) shares of choices for more expensive (cheap) alternatives. We estimated both the ASD and the main-effects choice models in terms of the hierarchical Bayes multinomial logit (HB-MNL). Our results indicate that both models performed well in terms of goodness-of-fit and predictive accuracy statistics. The ASD-HB-MNL model provided a better model fit due to its higher complexity, while cross-validated hit rates were comparable for both designs. Both models further yielded a number of non-monotonic price curves at the individual respondent level. We therefore imposed monotonicity constraints by tying offending values of individual HB draws after model estimation. Predictive accuracy statistics improved for the ASD-HB-MNL, but decreased for the main-effects HB-MNL. Finally, first choice simulations revealed for both modeling approaches significant differences in shares of choice predictions between the unconstrained and constrained model variants, in particular when alternatives with extremely different prices were included.[1, 2]

[1] R. M. Johnson, "Monotonicity constraints in choice-based conjoint with hierarchical bayes," *Sawtooth Software, Research Paper*, 2000.
[2] K. E. Train, "Discrete choice methods with simulation," *Cambridge University*, 2009.

Keywords

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