Abstract
The stochastic variance in discrete choice models is generally presumed to be constant. When data used for estimation comes from multiple sources or different situations, temporal and systematic dynamics may exist in the environment, which in prior literature have been captured mainly by utility shifts. In this paper, we use field data on satellite radio service purchases in a car rental business to illustrate the importance of accounting for non-constant stochastic variance in choice models. We provide converging empirical evidence that the stochastic variance is larger during the reservation process, than at the rental counter, even after controlling for the potential utility shift. Thus, making a purchase for future consumption is subject to more uncertainty. More interestingly, we find that assuming constant stochastic variance will not only bias the parameter estimates, but also result in unexpected mistakes. That is, it may reverse the sign of the utility shift, indicating that accounting for non-constant stochastic variance is not just necessary but actually a must. We also study GPS device purchases in the same setting and find no support of non-constant stochastic variance, suggesting that it may only function on hedonic products.

Dr Dai Yao is an Assistant Professor of marketing at the National University of Singapore Business School. He received his PhD in Management from INSEAD in 2014, Msc in Operations Management from Singapore Management University in 2009, and B.Eng in Computer Science and Technology from Tsinghua University in 2006. His research examines consumer and firm behavior in various business contexts enabled by new technologies, including social media and network-mediated environment, sharing economy, consumer financing, mobile games, mobile shopping, car rental and taxi ride, online labour markets, and crowdsourcing among others. His research has been accepted for publish in top marketing and management journals such as Marketing Science and Management Science. Prior to academia, he had extensive working experience in high-tech research institutes and companies such as Microsoft Research Asia, Netease, and Infosys.