

A Bayesian Multivariate Microeconometric Model for Estimation of Price Elasticity of Demand

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Abstract : Estimation of price elasticity of demand is a valuable tool for the task of price settling. Given its relevance, it is an active field for microeconomic and statistical research. Price elasticity in the industry of oil and gas, in particular for fuels sold in gas stations, has shown to be a challenging topic given the market and state restrictions, and underlying correlations structures between the types of fuels sold by the same gas station. This paper explores the Lotka-Volterra model for the problem for price elasticity estimation in the context of fuels; in addition, it is introduced multivariate random effects with the purpose of dealing with errors, e.g., measurement or missing data errors. In order to model the underlying correlation structures, the Inverse-Wishart, Hierarchical Half-t and LKJ distributions are studied. Here, the Bayesian paradigm through Markov Chain Monte Carlo (MCMC) algorithms for model estimation is considered. Simulation studies covering a wide range of situations were performed in order to evaluate parameter recovery for the proposed models and algorithms. Results revealed that the proposed algorithms recovered quite well all model parameters. Also, a real data set analysis was performed in order to illustrate the proposed approach.

Keywords : price elasticity, volume, correlation structures, Bayesian models

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