Bayesian Conditional Autoregressive Geometric Process Model for Range Data

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Abstract

Extreme value theories indicate that the range is an efficient estimator of local volatility on a financial asset return. This paper proposes a novel geometric process (GP) framework for range data that nests the well known Conditional Autoregressive Range (CARR) model. We extend the GP model of Lam (1988) to a Conditional Autoregressive Geometric Process Range (CARGPR) model that allows for flexible trend pattern, jumps and leverage effect. The widely used log-normal (error) distribution for range data is replaced by the log-t distribution for robustness consideration. We demonstrate in a simulation study that high accuracy in parameter estimation in CARGPR model is achieved. In our empirical study, we analyse the range data of the AORD index and show that the proposed CARGPR model outperforms the CARR model in both in-sample estimation and out-of-sample forecast.

Keywords: Bayesian inference; CARR model; Geometric process; Range data