Bayesian inference for integer-valued GARCH models

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Integer-valued time series modeling has seen a considerable evolution in recent decades where an important role is played by the generalized autoregressive conditionally heteroskedastic (INGARCH) process. Statistical analysis for the INGARCH model were mainly based on quasi-maximum likelihood estimates which enjoy simple computational complexities while having good asymptotic properties. However, in finite samples, these estimates may be less efficient than estimates based on the Bayesian approach for which reproducibility is allowed and simulation-based forecasting is appealing.
This work proposes a Bayesian MCMC estimate for INGARCH models under three conditional distributions: the Poisson distribution, the negative binomial distribution and the quasi-Poisson distribution. The estimate is based on the Griddy-Gibbs sampler under diffuse priors. Model selection is carried out using the Deviance Information Criterion and some MCMC diagnostic tools are presented to assess the performance of the proposed estimate. A comparison of the proposed estimate with the Poisson QMLE (Ahmad and Francq, 2016) and the negative binomial QMLE (Aknouche et al., 2018) under the three mentioned distributions is made. A Bayesian in-sample and out-of-sample forecasting procedure is proposed for some real count time series data.

Références

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