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Nonlinear Autoregressive Model with Stochastic Volatility Innovations: Semiparametric and Bayesian Approach

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Abstract. The first-order nonlinear autoregressive model with the stochastic volatility as the model of dependent innovations is considered and a semiparametric method is proposed to estimate the unknown function. Optimal filtering technique based on sequential Monte Carlo perspective is used for estimation of the hidden log-volatility in this model. Bayesian paradigm is applied for estimation of both the unknown parameters and hidden process using particle marginal Metropolis-Hastings scheme. Furthermore, an empirical application on simulated data and on the monthly excess returns of S&P 500 index is presented to study the performance of the schemes implemented.

Keywords: Stochastic volatility; Semiparametric estimation; Sequential Monte Carlo filtering; Bayesian estimation.