# Markov-Switching Quantile Autoregression

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Note: This paper has been redeveloped to my coauthored paper with Richard Luger and the title has been changed to "Markov-Switching Quantile Autoregression: A Gibbs Sampling Approach"

**Abstract**

This paper considers the location-scale quantile autoregression in which the location and scale parameters are subject to regime shifts. The regime changes in lower and upper tails are determined by the outcome of a latent, discrete-state Markov process. The new method provides direct inference and estimate for different parts of a nonstationary time series distribution. Bayesian inference for switching regimes within a quantile, via a three-parameter asymmetric-Laplace distribution, is adapted and designed for parameter estimation. Using the Bayesian output, the marginal likelihood is readily available for testing the presence and the number of regimes. The simulation study shows that the predictability of regimes and conditional quantiles by using asymmetric Laplace distribution as the likelihood is fairly comparable with the true model distributions. However, ignoring that autoregressive coefficients might be quantile-dependent leads to substantial bias in both regime inference and quantile prediction. The potential of this new approach is illustrated in the empirical applications to macroeconomic and financial variables to characterize different parts of a data distribution. Furthermore, this paper assesses the economic significance of the proposed model by out-of-sample Value-at-Risk forecasts for capital requirement under the Basel II Accord regulation.

*Keywords*: Asymmetric-Laplace Distribution, Metropolis-Hastings, Block-at-a-Time, Asymmetric Dynamics, Transition Probability, Basel II Accord, Capital Charge, Out-of-Sample Value-at-Risk Forecast, Mixed Data Frequency (MIDAS)

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