Falling and Explosive, Dormant and Rising Markets via Multiple-regime Financial Time Series Models

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Abstract

A multiple-regime threshold nonlinear financial time series model, with a fat-tailed error distribution, is discussed and Bayesian estimation and inference is considered. Further, approximate Bayesian posterior model comparison among competing models with different numbers of regimes is considered: effectively a test for the number of required regimes. An adaptive MCMC sampling scheme is designed, while importance sampling is employed to estimate Bayesian residuals for model diagnostic testing. Our modeling framework provides a parsimonious representation of well-known stylized features of financial time series and facilitates statistical inference in the presence of high or explosive persistence and dynamic conditional volatility. We focus on the three-regime case: the main feature of the model is the capturing of mean and volatility asymmetries in financial markets, while allowing an explosive volatility regime. A simulation study highlights the properties of our MCMC estimators and the accuracy and favorable performance as a model selection tool, compared to a deviance criterion, of the posterior model probability approximation method. An empirical study of eight international oil & gas markets illustrates strong support for the three-regime model over its competitors, in most markets, in terms of model posterior probability and in showing three distinct regime behaviors: falling/explosive, dormant and rising markets.

KEY WORDS: Asymmetry; Markov chain Monte Carlo method; model selection; Deviance Information Criterion (DIC).