

Exact Bayesian Inference for Markov Switching Diffusions

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Abstract

We address the problem of Bayesian inference for discretely observed regime switching diffusions. Switching diffusion models extend ordinary diffusions by allowing for jumps in instantaneous drift and volatility. The jumps are driven by a latent, continuous time Markov switching process. As for ordinary diffusion models, the transition density implied by a Markov switching SDE is intractable, which complicates likelihood-based inference. We design an MCMC algorithm that targets the joint posterior of diffusion parameters and the latent regime process. The algorithm is exact in the sense that estimates are unbiased and the Markov chain central limit theorem applies. In the process, we improve on prior exact methods for ordinary diffusions.