

Swiss Federal Institute of Technology (ETH) Zurich

Department of Mathematics

Master Thesis

Bayesian Filtering for Volatility Estimation

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Abstract

The first part of this thesis is an introduction into Bayesian filtering. First, the classic Kalman filter algorithm is derived and presented. Second, non-linear systems are considered and different filtering techniques presented, including both Kalman filter based algorithms and algorithms based on sampling. Finally we talk about non-Gaussian noise processes and introduce the particle filter.

The second part of this thesis deals with the application of those algorithms to continuous asset price models and jump models for the extraction of the instantaneous volatility.

The main focus lies on the famous models by Heston and Bates. We compare the performance of the different algorithms in a simulated setting and obtain an easy-to-implement filter that works surprisingly well in both the Heston and the Bates model.