Einladung zum Oberseminar Wissenschaftliches Rechnen

Julius-Maximilians-Universität Würzburg
Lehrstuhl für Wissenschaftliches Rechnen IX

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Estimating volatility and parameters of stochastic volatility models

The estimation of the volatility of stochastic volatility models is challenging, because stochastic volatility is a latent variable. We consider the Heston stochastic volatility model in two cases: when the dynamics of the stock price contain jumps and when they do not. First we estimate the volatility and then the parameters of the model by applying a sequential Monte Carlo method known as particle filter. This technique is popular for nonlinear filtering, since it is applicable to any system and it does not require any ad hoc approximation. The two equations of the model of interest are treated from a stochastic filtering point of view: the volatility is a hidden process that can be estimated, supposing that its measurements (the log price) are available at each time step. The complete solution of a filtering problem is given by the posterior distribution of the hidden process. When applying a particle filter, this probability density function is approximated by a weighted sum of $N \gg 1$ Dirac deltas, centered in the N random samples, known as *particles*. At each time step, these particles are generated from a so-called *importance function* or *proposal distribution*. Since one of the key factors for a successful implementation is choosing a good function, we compare the results given by relevant proposals. Regarding the case without jumps, we notice that the exact sampling method gives a better approximation of the volatility compared to the case in which the equations are discretized. When considering the case with jumps, we employ only the exact sampling method. Standard particle filter algorithms assume perfect knowledge of the static parameters of the underlying model. In the model of interest, the parameters are not known in advance. Thus, we construct a parallel filtering algorithm, treating each parameter as an additional state. The issue of parameter estimation can be the subject of further research attention. One may consider developing dierent methods for the estimation of the parameters, other than the augmented space formulation.

Ort: Raum 30.02.003 (2. Stock) (Mathegeb. 30 West) Zeit: Montag, 11.02.2013, um 11.00 Uhr

Zu diesem Vortrag laden wir Sie herzlich ein.

gez. Prof. Dr. Alfio Borzi

gez. Prof. Dr. Bastian von Harrach