

SOE 8: Monte Carlo Methods in Financial Market Modeling (Invited Talk Thomas Lux)

Time: Tuesday 9:30–10:15

Location: MA 001

Invited Talk SOE 8.1 Tue 9:30 MA 001
Estimation of Agent-Based Models using Sequential Monte Carlo Methods — •THOMAS LUX — University of Kiel

Estimation of agent-based models is currently an intense area of research. Recent contributions have to a large extent resorted to simulation-based methods mostly using some form of simulated method of moments estimation (SMM). There is, however, an entire branch of statistical methods that should appear promising, but has to our knowledge never been applied so far to estimate agent-based models in economics and finance: Markov chain Monte Carlo methods designed for state space models or models with latent variables. This later class of models seems particularly relevant as agent-based models typically consist of some latent and some observable variables

since not all the characteristics of agents would mostly be observable. Indeed, one might often not only be interested in estimating the parameters of a model, but also to infer the time development of some latent variable. However, agent-based models when interpreted as latent variable models would be typically characterized by non-linear dynamics and non-Gaussian fluctuations and, thus, would require a computational approach to statistical inference. Here we resort to Sequential Monte Carlo (SMC) estimation based on a particle filter. This approach is used here to numerically approximate the conditional densities that enter into the likelihood function of the problem. With this approximation we simultaneously obtain parameter estimates and filtered state probabilities for the unobservable variable(s) that drive(s) the dynamics of the observable time series.