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ECONOMETRICS RESEARCH SEMINAR

- June 15, 2010, 11 am
- HSII (lecture room II, groundfloor)
  Institut für Höhere Studien
  Stumpergasse 56, 1060 Wien

Helgi Tómasson,
University of Iceland:

"Computational aspects of simulation and estimation of CARMA processes"

ABSTRACT

Many real processes are continuous in nature, but are due to technical reasons, only observed at discrete time-points. The advantage of modeling the continuous-time process directly, as opposed to the usual time-series approach is that the parameterization of the process is not a function of the sampling interval. The disadvantage is the increased mathematical complexity and the higher computational burden of the continuous-time modeling. In discrete time-series analysis the famous text by (Box-Jenkins 1976) offers an intuitive approach of time-series modeling. A class of simple ARMA (Auto-Regressive-Moving-Average) models to capture short term dynamics of stationary processes, the ARIMA to capture certain types of non-stationary processes. (Box-Jenkins 1976) expand these by adding seasonal structure, such as the seasonal ARIMA. This paper implements a computational approach to a continuous-time ARIMA. A continuous-time process is observed at discrete, not necessarily evenly spaced, time-points. The idea is to create a computationally feasible continuous-time version of the (Box-Jenkins 1976) approach. The stationary part of it is assumed to be continuous-time ARMA (p,q), CARMA (p,q). The non-stationary part can be modeled as a continuous-time random-walk (a Wiener process), a seasonally differenced, where season is day, a year (about 365.25 days), or both. I.e. a seasonally integrated CARMA. The inclusion of deterministic explanatory variables is straightforward. When the innovation process is a Wiener process likelihood analysis, maximum-likelihood or Bayesian, is straightforward. Other types of innovation processes are discussed. An R-package has been developed to perform the computations. Some data examples of natural science and finance are illustrated.