

CREST - GENES

Cours doctoraux 2025 – 2026

INFERENCE IN TIME-VARYING PARAMETER MODELS

Alessandra LUATI

*Imperial College London
Department of Mathematics*

SCHEDULE	Monday	31 March 2025 7 April 2025	From 10:15 to 13:15	Room : 2033
	Thursday	3 April 2025 10 April 2025	From 10:15 to 13:15	Room : 2033

Contents

Statistical models are most of the time specified to represent and analyse parameters of interest (unknown unobserved quantities) as random functions of random variables. The classical linear regression model, for example, can be interpreted as a model for the mean of a response variable, conditional to the sigma-algebra generated by other random variables, the predictors. Similarly, autoregressive processes model the time-varying mean of the distribution of a random variable at a given time, conditional to the past information, there represented by the filtration of the process. As long as time enters into the specification, the model is dynamic and the parameters of interest are time-varying. These parameters are pervasive in empirical applications as they typically model quantities of interest for science, technology, finance, medicine, climate.

The aim of the course is to provide a modern, solid and accessible introduction to inference in models for time-varying parameters. The focus will be on the recent class of score-driven models and on likelihood-based methods.

Outline

The course is divided in four lectures, each lasting 3 hours, covering time-varying parameter models for (i) location (ii) scale (iii) quantiles (iv) multivariate models. Each class will discuss novel methods compared to more traditional ones, and will comprise: introduction, model development, stochastic properties, asymptotic theory, empirical applications. Open problems and directions for future research will be discussed throughout each lecture.

Prerequisites

Knowledge of statistics, probability and stochastic processes, and linear time series analysis is welcome. When needed, basic concepts will be reviewed.

Evaluation

Take home exam.

References

Lecture notes will be provided with updated references.