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Seminar

TIME SERIES MODELS WITH TIME-DEPENDENT COEFFICIENTS

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TIME SERIES MODELS WITH TIME-DEPENDENT COEFFICIENTS

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Autoregressive-moving average (ARMA) models with time-dependent coefficients (tdARMA) and marginally heteroscedastic innovation variance provide a natural alternative to stationary ARMA models for economic time series. Several theories have been developed in the last thirty years for parametric estimation in that context. First, we focus on univariate models for the case where the coefficients depend both on time and the series length. Absence of independence, stationarity and ergodicity implies that assumptions are still more delicate than in the general time series theory. We summarize our theory based on array processes. Then, we compare our asymptotic approach to another approach due to Dahlhaus, the local stationarity theory. We illustrate our theory on a dataset of temperatures in Alpine cities and on a dataset of economic time series. Secondly, we provide new theoretical results in a multivariate setup:

- a fundamental theorem for the asymptotic theory;
- a lemma for reducing the assumption on moments from 8 to slightly more than 4;
- a theorem to establish convergence for the two covariance matrices V and W involved in the sandwich formula.

We apply them on time-dependent vector AR(1) and MA(1) models. In particular, we show simulation results for different types of distributions (including multivariate Laplace and multivariate Student) and compare them to the standard errors deduced from the theory.