

Advanced Econometrics

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This course deals with some specific topics in econometrics and time-series.

Hopefully, I will be able to cover these topics.

1. Spectral analysis

- a. *The Fourier transform*
- b. *The spectral representation theorem and the definition of the spectrum*
 - A nice feature: orthogonalization across frequency bands. From autocorrelation to heteroscedasticity.
- c. *Filters and their spectral properties (band pass, first differences)*
- d. *Multivariate analysis: cross-spectra, coherency and cohesion*
- e. *Estimation of the spectrum*
 - The periodogram
 - The smoothed periodogram
 - The “parametric” spectrum

2. Factor analysis

- a. *Principal components.*
- b. *Dynamic factor models.*
 - The Kalman filter (Stock and Watson)
- c. *From “small n ” to “large n ” models.*
 - As n gets larger, the idiosyncratic disappears. Back to PC.
 - The static world (Connor and Korajczyk).
 - The dynamic world (Stock and Watson - Forni, Lippi, Hallin and Reichlin – Forni, Lippi, Giannone and Reichlin).
- d. *FAVAR models.*

3. DSGE estimation

- State space models. Full information ML. The Kalman filter. Numerical tools: simulated annealing.
- Brief introduction to Bayesian econometrics.
- Estimation in a Bayesian framework: MCMC methods.
- Identification.
- Estimation in the frequency domain.

4. Non-fundamentalness

- Definition and implications.
- Testing for non-fundamentalness.
- When the econometrician knows less than the agent (No news in business cycles, Forni, Gambetti and Sala, EJ).
- When both the econometrician and the agents have imperfect information (Noise bubbles, forthcoming, EJ, Noisy news in business cycles, AEJ: Macroeconomics, Forni, Gambetti, Lippi and Sala).
- A theory of VARs with less observables than shocks (Reassessing Structural VARs: Beyond the ABCs (and Ds), Forni, Gambetti and Sala).
- Uncertainty shocks (Forni, Gambetti and Sala)

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