

# High-dimensional & Bayesian econometrics

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Fall Term

12 hours, 2 CFU (estensibile a 18, 3 CFU)

Tentative Syllabus

Part Gianluca Cubadda

1) Dynamic regression models with many predictors

- Dimension reduction methods (Principal component regression, diffusion indexes, partial least squares)
- Regularization methods (Ridge, Lasso and their variants)

2) Out-of-sample evaluation

- Direct forecasting
- Recursive and Rolling Forecasts
- Forecast Evaluation Statistics
- Cross-validation for time-series
- Test for Equal Predictive Accuracy
- The Model Confidence Set

3) Classical methods for large vector autoregressive models (VARs)

- Sparse VARs
- The factor-augmented VAR
- The dimension reducible VAR

Class material: mainly papers, and textbook:

Peña, D, and Tsay, R.S. (2021), Statistical learning for big dependent data, Wiley. New York.

Part Stefano Grassi

## Overview

The objective of this module is to introduce students to advanced topics in macroeconometrics to enhance independent research. Examples of active topic of research will be provided during the lectures.

## Prerequisites

Students must have good knowledge of basic time series econometrics.

Students should have working knowledge of MATLAB.

- Linear filters
- State-space form
- Kalman filter and Nonlinear Kalman filter
- Maximum likelihood estimation
- Bayesian estimation (MCMC, Importance Sampling, IS<sup>2</sup>)
- DSGE examples. Time Varying Parameters VAR examples

## Book

Bayesian Estimation of DSGE Models

Edward P. Herbst and Frank Schorfheide

Series:

The Econometric and Tinbergen Institutes Lectures