

Macroeconometrics

Module 4, 2019-2020

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Course description

This course provides a survey of recent developments in time series econometrics, with a strong emphasis on macroeconomic applications, rather than on econometric theory. We will begin with a quick overview of the simple univariate models and filters. Then, we will cover multivariate models: VAR and SVAR models, different methods of their identification, multivariate unit roots, cointegration and vector error-correction models. After that, we will study the models in data-rich environment: factors models and FAVARs. And, finally, we will discuss different methods of estimation and inference of the dynamic stochastic general equilibrium models (DSGE), in particular, simulated method of moments, maximum likelihood, Bayesian methods and hybrid models (DSGE-VAR).

Course requirements, grading, and attendance policies

There will be a few (maximum 3) home assignments (50% of the grade). The exam (50% of the grade) will contain questions on a published applied macroeconomic article handed out in advance. All these components (including all home assignments), as well as at least 70% attendance, are mandatory for getting a passing grade.

Course contents

1. **Univariate time series models:** business cycles and time series econometrics, the Wold representation theorem, stationary ARMA models, spectrum, data transformations and univariate filters
2. **Reduced-form Vector Autoregressions:** definition, estimation, inference and forecasting, Granger causality, impulse response functions, variance decomposition
3. **Structural Vector Autoregressions:** definition, impulse response functions, variance decomposition, historical decomposition, identification: short-run restrictions, long-run restrictions, sign restrictions, applications
4. **Unit roots, spurious regressions and cointegration:** definition, testing the unit roots, spurious regression, cointegration, testing and estimation of co-integrating relations, VECM representation of cointegrated VAR, applications

5. **Factor models and FAVAR:** static and dynamic factor models, principal components analysis, determining a number of static and dynamic factors, structural FAVAR and its identification, applications
6. **DSGE models and their estimation:** definition, approximating and solving DSGE, calibration, GMM and simulated GMM estimation, ML estimation, Bayesian estimation of DSGE models

Course materials

Required textbooks and materials

1. Hamilton, James D., *Time Series Analysis*, Princeton University Press, 1994
2. DeJong, David N. & Dave, Chetan, *Structural Macroeconometrics*, Princeton University Press, 2nd ed., 2011
3. Kilian, Lutz & Lutkepohl, Helmut, *Structural Vector Autoregressive Analysis*, Cambridge University Press, 2017

Additional materials

1. Lutkepohl, Helmut, *New Introduction to Multiply Time Series Analysis*, Springer, 2007
2. Canova, Fabio, *Methods for Applied Macroeconomic Research*, Princeton University Press, 2007
3. Favero, Carlo A., *Applied Macroeconometrics*, Oxford University Press, 2001

I will also provide a reading list of papers applying models and methods discussed in the class, with the rate of about 2-3 per week.

Academic integrity policy

Cheating, plagiarism, and any other violations of academic ethics at NES are not tolerated.