

Empirical Tools in Macroeconomics

Instructor: Irina Panovska

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Time and venue: June 18 to June 21 (Monday to Thursday)

From 1 PM to 4 PM

University of Zagreb, Faculty of Economics and Business

Trg J. F. Kennedyja 6, 10000 Zagreb

Computer lab classroom **40** (ground floor)

How to apply: Register at <https://goo.gl/forms/Yh9rGk7NHAmZqp9y2>. A maximum number of participants is limited to 30.

Tuition fee: No tuition fee

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Course Objectives and Description

The course is organized as an intermediate/advanced computer lab guide to multivariate time series models in economics and finance. The target audience for the course is academic researchers, graduate students (both Masters and Ph.D.) and professional economists working at banks and policy institutions. It is an intermediate/advanced course which requires basic knowledge of econometrics, with a strong focus on the empirical applications.

The course has three main objectives. First, it will introduce both basic **linear** and advanced **nonlinear** multivariate econometric models that are commonly used in macroeconomics. Second, the participants will get **hands-on experience** with all models covered in the class by doing **empirical exercises** in R. The exercises will introduce the participants to reading R code, writing R code, and making modifications to existing scripts to be able to use the code for their own applications. Third, the applications will focus both on classic and **very recent** empirical macroeconomic studies that use **nonlinear models** and the participants will get a broad overview of different scenarios how the models can be used in **academic research** and for **policy analysis**. The course will be focused on **empirical applications** and the intuition behind the models rather than on the mathematics or on the asymptotic theory. However, the necessary equations and mathematics will be discussed and there will be a list of suggested supplementary readings for readers who are interested in a more technical treatment of the models. **We will be using R and RStudio.**

Course Schedule

The course will last four days. Each lecture will consist of two sessions: a “lecture session” for the first part and “tutorial sessions” for the second. Note: the specific sub-topics might be subject to change. The day-by-day topic assignment for days 2 through 4 is tentative and the schedule will be tailored to match the audience’s background.

Day 1: Introduction to Time Series in R, Review of Linear Models (from 1 PM to 4 PM)

- Review of basic univariate models (Assignment 1, Assignment 2, Assignment 3)
- Cointegration (Assignment 4)

Day 2: Multivariate models (from 1 PM to 4 PM)

- Day 1/ 2: Vector Autoregressions using Short-Run Timing Restrictions (Assignment 5)
- Vector Autoregressions using Long-Run Timing Restrictions (Assignment 6)
- Vector Autoregressions using Sign Restrictions (Assignment 7)
- A primer on Bayesian Analysis
- Time Varying Parameter VAR (Assignment 8)

Days 3 and 4: Nonlinear Multivariate Models (from 1 PM to 4:30 PM)

- Introduction to Markov-Switching Models (Assignment 9)
- Threshold models (Assignment 10)
- Local projections (Assignment 11)
- Local projections for nonlinear models (Assignment 12)
- Examples of recent studies that use nonlinear models for policy analysis

Potential Applicants

This course could be interesting for the following groups:

- Professional macroeconomists in banks, insurance, Ministry of finance, central bank, and the government
- Macroeconomic and finance specialist interested in forecasting
- Academic researchers who are interested in modern time series analysis
- Graduate and Ph.D. students in economics and finance

Prerequisites

The course will start at the intermediate level and will gradually build up to an advanced level. It is aimed at students who are familiar with the basics of econometrics and have some experience with empirical models. Participants should be familiar with the basics of regression analysis (t-statistics, standard errors, testing, properties of OLS estimators) and the basics of time series (ARIMA models). The course will start with a brief refresher of time series models. Good command of undergraduate econometrics is sufficient for understanding almost all concepts covered in the class. Graduate econometrics is sufficient for active participation in the course. Good refreshers of the basic time series concepts can be found in Enders (any edition, Chapters 1-4 in the 2010 edition) or Time Series Analysis, by James D. Hamilton, 1994 (fantastic reference book for a lot of the classical approaches that are built into programs such as Eviews and Stata, but it is an older book so it does not include a lot of newer developments). A good refresher of basic econometrics can be found in Stock and Watson, Introduction to Econometrics (any edition, advanced undergraduate level), Wooldridge (2015), or Angrist and Pischke, “Mostly Harmless Econometrics” (any edition, excellent reference book). Scans and copies of the relevant chapters are included with the class readings.



Software:

Prior programming knowledge is helpful, but not required. It is recommended that the participants are familiar with the very basic concepts of software and empirical analysis. We will be using R and RStudio in the course. All assignments will be self-contained and will include all the components needed to run the models. The first three assignments will be introductory assignments that will help the participants familiarize themselves with the basics of R. Additional introduction to R can be found on the CRAN project [website](#).

Lecturer (Dr. Irina Panovska, Lehigh University, USA):

Irina Panovska (www.irinapanovska.com) is an Assistant Professor of Economics at Lehigh University where she currently holds an endowed assistant professorship chair for excellence in research, teaching, and mentorship. Her research interests are applied macroeconomics and business cycle nonlinearities, with a particular focus on the nonlinear transmission of transitory shocks both to output and to labor markets, and their implications for designing policy. She has published her research in *Journal of International Money and Finance*, *Macroeconomic Dynamics*, *Journal of Macroeconomics*, *Economic Modelling*, *Studies in Nonlinear Dynamics and Econometrics* and other quality journals. She has been a visiting scholar at the University of New South Wales. Dr. Panovska is an elected member of the Executive Committee of the Society for Nonlinear Dynamics and Econometrics.