
Time Series

PhD in Economics and Statistics – Università degli Studi di Milano Bicocca
PhD in Economics and Finance – Università Cattolica del Sacro Cuore

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Course Description

The availability of accurate estimates and forecasts of macroeconomic and financial time series is key for central banks, investors and more generally for all economic agents when their decisions depend on the uncertain future value of one or more variables of interest.

This module focuses on the Time Series econometrics. The aim is to introduce students to the the most relevant methodologies for the analysis of univariate and multivariate economic time series.

Prerequisites

Basic econometrics, inference principles and estimators (OLS, ML, IV, GMM). Basic knowledge of MATLAB might also help.

Course Objectives

Expose students to the basic issues faced when developing econometric models involving macroeconomics and financial variables. A tentative list of topics includes:

Part I

1. Heteroskedasticity and autocorrelation: issues and remedies
2. Introductions to stochastic processes and difference equations
3. Univariate time series models

Part II

1. Nonstationarity
2. Multivariate time series models
3. Models for volatility

Course Structure

The course will devote equal space to theory and practical sessions with MATLAB.

Assessment

Final exam with theoretical and practical questions (i.e. interpretation of empirical results)

Suggested Readings

Overview of time series econometrics

- Stock, J.H., and M.W. Watson. 2017. "Twenty Years of Time Series Econometrics in Ten Pictures." *Journal of Economic Perspectives*, 31(2): 59-86.

Books

- Enders, W. (200?). Applied econometric time series. John Wiley & Sons.
- (Main reference) Hamilton, J.D. 1994. *Time series analysis*, Princeton U. Press.
- Lütkepohl, H. 2005. *New introduction to multiple time series analysis*. Springer.
- (*Free online*): Sheppard K. *MFE online notes* <https://www.kevinsheppard.com>
- (Forecasting, free online): Diebold, F. *Elements of forecasting* <https://www.sas.upenn.edu/~fdiebold/Teaching>
- (*SVAR, free online*): Kilian L. & H. Lütkepohl, 2017. *Structural Vector Autoregressive Analysis*. Cam. U. Press. Book & code: <https://sites.google.com/site/lkilian2019/home>

Matlab and software related resources (links)

- MFE MATLAB (K. Sheppard): Link
- Econometrics Toolbox (J. Le Sage): <https://www.spatial-econometrics.com>
- Phyton and Julia: <https://lectures.quantecon.org/>
- Phyton for econometrics (K. Sheppard): <https://www.kevinsheppard.com>