

1 Core 3: Dynamics: Time Series and Simulation Based Estimators

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The first part of the course introduces students to the analysis and modelling of time series processes, including stationary and non-stationary stochastic processes, estimation and shock identification in multivariate time series. The second part focuses on estimation and inference using generalized method of moments and simulation based estimators.

Topic 1 (2 h)

Basic Time Series concepts: Stationarity, Ergodicity and Markovian Transition.

Hamilton (Chapters 2, 7), Lecture notes.

Topic 2 (4 h)

Univariate ARMA Models: Identification (ACF and PAF) and Estimation.

Hamilton (Chapter3), Lecture notes.

Topic 4 (4 h) *Multivariate VAR Models and the State Space Representation:* Specification, Estimation and Structural Shocks Identification, the Kalman Filter.

Hamilton (Chapter 11, 13), Lecture notes.

Topic 5 (4 h)

Generalized Method of Moments: Estimation and Inference

- Adda and Cooper, Chpt. 4
- Hansen, L. and K. Singleton, "Generalized Instrumental Variables Estimation of Nonlinear Rational Expectations Models," *Econometrica*, 50 (1982), 1269-86.
- J. Wooldridge,(2010) *Econometric Analysis of Cross Section and Panel Data*, MIT Press, Chpt. 8

Topic 6 (7 h)

Simulated Method of Moments: Estimation and Inference

- Adda and Cooper, Chpts. 5-8.
- Adda, J. and R. Cooper, “Balladurette and Juppette: A Discrete Approach,” *Journal of Political Economy*, August, 2000.
- Cooper, R. and G. Zhu, “Household finance over the life-cycle: What does education contribute?” *Review of Economic Dynamics*, 20 (2016), 63-89.
- Cooper, R. and J. Haltiwanger, “On the Nature of Capital Adjustment Costs,” *Review of Economic Studies*, 73 (2006), 611-33.
- Gourierous, C. and A. Monfort, (1996) *Simulation Based Econometric Methods*, Oxford University Press.
- Smith, A. ”Estimating Nonlinear Time-Series Models using Simulated Vector Autoregressions,” *Journal of Applied Econometrics*, 8 (1993), S63-84.

Exercise classes

There will be 6-8 exercise classes

Teaching material

- Adda, J. and R. Cooper, *Dynamic Economics: Quantitative Methods and Applications*, MIT Press.
- Hamilton, J. H. (1994), *Time Series Analysis*, Princeton University Press
- Harvey, A.C. (1993), *Time Series Models*, Harvester-Wheatsheaf
- J. Wooldridge, (2010) *Econometric Analysis of Cross Section and Panel Data*, MIT Press,
- Lecture notes by the instructor.

Final exam and Grading

There will be problems set to be graded by TAs in classes (20%) and a final exam (80%).