The econometrics of mixed causal and non-causal models
Syllabus

Gilles Dufrénot

Presentation

The course presents the econometric evaluation of some models widely used by economists, given the structure of dynamic models that incorporate backward-looking time to measure the influence of the past and forward-looking time to take account of the influence of the future: for instance in dynamic optimization models, rational expectations models, and economic policy models. Furthermore, most shocks that affect economies are not Gaussian, and can be unexpected and sudden. This motivates the use of mixed causal and non-causal models. This course will be of interest to students working on applied economics topics. The course presents the theoretical (econometric) foundations of these models and some illustrations using economic data. It presents methods at the cutting edge of current knowledge of these models (identification, aggregation, etc.). The course allows students to practice these models on their own using the R software.

Course duration: 12 hours (four 3-hour sessions).

Prerequisites: knowledge of the basics of econometrics and time series econometrics.

Course outline

1.- Mixed causal and non-causal models

2.1.- Assumptions about residuals: non-Gaussian distributions in non-causal models
2.2.- Examples of non-causal model simulations
2.3- Identification, estimation, and inference: classical and recent methodologies (spectral estimation, MAD estimator)
2.4.- Mixed models with exogenous regressors
2.5.- VAR non-causal models

2.- Some applications

2.1.- Exploring the MARX package in R
2.2.- Non-causal AR-ARCH models to financial data
2.3.- Modelling speculative bubbles and asymmetric cycles
2.4.- Application to Rational expectations models

Readings

- Gourieroux Christian, Jasiak Joann (2017), Noncausal vector autoregressive process: Representation, identification and semi-parametric estimation, Journal of Econometrics, 1, 118-134.
- Hecq Alain, Issler Joao Victor, Telg Sean (2020), Mixed causal-non causal autoregressions with exogenous regressors, Journal of Applied Econometrics, 35(3), 328-343.
- Hecq, Alain and Sun, Li (2021), Selecting between causal and noncausal models with quantile autoregressions" Studies in Nonlinear Dynamics & Econometrics, vol. 25, no. 5, 2021, pp. 393-416.
- Hecq Alain, Voisin Elisa (2021) Forecasting bubbles with mixed causal-noncausal autoregressive.