WORKSHOP ON MACROECONOMIC MODELING WITH JULIA
WITH APPLICATIONS IN OPTIMIZATION MODELS AND ESTIMATION METHODS

Jointly organized by the Financial Stability and Development (FSD) network of the IDB and the Central Bank of Argentina

Buenos Aires, Argentina - December 18-19, 2017
Central Bank of Argentina (BCRA) -

MONDAY, DECEMBER 18

9:00 a.m. – 12:00 p.m.

Estimation, Forecasting, and Policy Analysis with DSGE and State Space Models
By Marco del Negro (Federal Reserve Bank of New York)

12:00 – 2:00 p.pm   *Lunch break*

2:00 p.m. – 5:30 p.m.

Part I - Macroeconomic Modeling with Julia
By Abhi Gupta and Pearl Li (Federal Reserve Bank of New York)

TUESDAY, DECEMBER 19

9:00 a.m. – 11:00 a.m.

Part II - Macroeconomic Modeling with Julia
By Abhi Gupta and Pearl Li (Federal Reserve Bank of New York)

11:00 a.m. – 11:30 a.m.   *Coffee break*

11:30 a.m. – 12:30 p.m.

Safety, liquidity, and the natural rate of interest
By Marco del Negro (Federal Reserve Bank of New York)

2:00 p.m. – 5:00 p.m.

Bilateral meetings FRBNY-BCRA

Estimation, Forecasting, and Policy Analysis with DSGE and State Space Models

Marco Del Negro
Central Bank of Argentina; December 18, 2017

Biography

Marco Del Negro is Vice President at the Federal Reserve Bank of New York, and co-leader of the DSGE Team there. His research focuses on the use of general equilibrium models in forecasting and policy analysis. He has published work in the American Economic Review, American Economic Journal: Macroeconomics, Journal of Econometrics, Journal of Applied Econometrics, Journal of International Economics, Journal of Monetary Economics, Journal of Money, Credit and Banking, International Economic Review, Journal of the European Economic Association, and the Review of Economic Studies. He is coauthor with Frank Schorfheide of a chapter on "Bayesian Macroeconometrics" in the "Oxford Handbook of Bayesian Econometrics", and of a chapter on "DSGE Model-Based Forecasting", in the "Handbook of Economic Forecasting."

Outline

Basic notions of Bayesian econometrics

- Bayes theorem; Testing and model selection (Bayes factors).

Time-series models

- State-space models; the Kalman filter and the likelihood computation
- Kalman smoothing, simulation smoothers and shock decomposition: Carter and Kohn and Durbin and Koopman simulation smoothers.

A Quick Overview of MCMC Methods

- What is MCMC?
- Metropolis-Hastings
- Gibbs sampler
- Sequential Monte Carlo (SMC)

DSGE and DSGE-VARs

- Introducing a simple workhorse DSGE model (brief)
- Estimation
- Impulse response function and variance decomposition
- Forecasting

References:

Lectures will be mainly based on:

- Del Negro and Schorfheide. Bayesian Macroeconometrics, Chapter 7 of the "Oxford Handbook of Bayesian Econometrics", Gary Koop, Herman Van Dyk and John Geweke eds., 2011 (also available here)

- Del Negro and Schorfheide. DSGE Model-Based Forecasting. In Graham Elliott and Allan Timmermann (eds.): "Handbook of Economic Forecasting," Vol 2A, 2013, Handbooks in Economics, Elsevier / North-Holland, 57-140. (also available here)

Other useful references are (these are general references; more specific references can be found in the course materials):

- Ed Herbst and Frank Schorfheide. Bayesian Estimation of DSGE Models. Princeton University Press. 2015.

- An and Schorfheide. Bayesian Analysis of DSGE Models. Econometric Reviews, 26(2-4), 2007, 113-172.

- Fabio Canova. Methods for Applied Macroeconomic Research. Princeton University Press. 2007.

- John Geweke, Contemporary Bayesian Econometrics and Statistics. Wiley & Sons 2005.

- Andrew Gelman, John B. Carlin, Hal S. Stern, Donald B. Rubin. Bayesian Data Analysis, Second Edition. Chapman & Hall/CRCTexts in Statistical Science.

Abhi Gupta and Pearl Li, Federal Reserve Bank of New York
December 18th-19th, 2017

1. Why use Julia?
    a. Trading off between low- and high-level languages for scientific computing
    b. Julia's strengths and weaknesses
    c. Why open source computing?
    d. How to interact with Julia: IDEs, Jupyter notebooks, and the REPL
    e. Hello World
2. Intro to the Julia language
    a. Overview of syntax, including comparisons to MATLAB and Python syntax
    b. Julia types: the type hierarchy, composite types, subtyping, parameterized types
    c. Multiple dispatch
    d. Writing "Julian code"
    e. Exercises
3. Julia packages for economists
    a. Economics-specific packages
    b. Numerical/statistics tools
    c. Function approximation
    d. Optimization and solvers
    e. Plotting
4. DSGE modeling in Julia with the New York Fed's DSGE.jl package
    a. Solving, estimating, forecasting, and plotting using an existing model
    b. The AbstractModel type
    c. Exercise: implementing an MA(1) model using DSGE.jl
    d. StateSpaceRoutines.jl: standalone package for state-space filtering and smoothing, including a nonlinear particle filter