WELCOME

to

A Bayesian Approach to Identification of Structural VAR Models

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Training Course

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What is Empirical Macro About?

- Empirical macro is concerned with the use of econometrics to learn about a phenomenon the researcher is interested in

  ⇨ use data to learn about unknown economic parameters that capture the relationship between macro variables

- "*Econometrics is the tool that forces economic ideas to face the reality of observations.*" (Peter C.B. Phillips)

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- Think of a simple regression model

  Goal: We want to learn about something *unknown*

  ⇨ the regression coefficient

  given something **known**

  ⇨ the data

Why Bayesian?

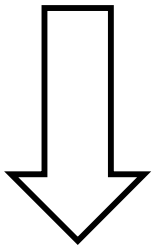
- In many applications, the econometrician possesses, in addition to the sample, *other information* about the parameters:
  - ➢ theoretical constraints on the parameter space: integrate theory with empirics (e.g. identifying restrictions, stability constraints)
  - ➢ previous empirical research: past samples, data from other countries, micro data (e.g. surveys)
- Bayesian analysis allows to:
  - ➢ include non-sample information in estimation in a flexible way
    - ✓ Vector autoregressions (VARs)
    - ✓ Short time series, measurement error
    - ✓ Lag length
  - ➢ account for uncertainty in decision-making context (e.g. policy)
  - ➢ analyze models that are intractable using classical methods

What Are The Goals of This Course?

- Chris Sims (2007):

  Being Bayesian is more than a basket of "methods",

  it is a mindset.



What we want to do is to study methods and applications of Bayesian inference to develop and embrace this mindset.

Course Overview

- Bayesian Methods and Numerical Simulation
- Bayesian Vector Autoregressive (BVAR) models
- Identification and structural (causal) analysis
- How to deal with COVID-19 observations

Vector Autoregressive Models

- Workhorse models in empirical macroeconomics
  - ➢ capture the dynamic interrelationships between variables that represent the economy
  - ➢ used for data description, forecasting, structural dynamics, and policy & counterfactual analysis
- Bayesian estimation of VAR models
  - ➢ Markov Chain Monte Carlo (MCMC) methods: Gibbs sampling algorithm
  - ➢ Choice of priors
    - ✓ Minnesota prior
    - ✓ normal-inverse Wishart prior
    - ✓ prior using dummy observations (data augmentation)

Identification and Structural Analysis

- The identification problem in structural VARs
  - Identification strategies: point and set identification
- A Bayesian interpretation of traditional approaches to identification
  - What prior information?
  - Delay, sign, and boundary restrictions
  - Prior information about structural coefficients and impacts of shocks
- Estimation and inference
  - Implementation: Metropolis-Hastings algorithm
  - How to compute credibility sets

Structural Breaks

- Structure of the economy evolves over time
  - Nonlinearities lead to different modeling choices (not covered in this course)
- Some events lead to abrupt changes
  - COVID-19 pandemic most dramatic example
  - Requires special treatment