Econ. 513, Time Series Econometrics Fall 2001 Chris Sims

Lecture List*

There will be 23 lectures. The midterm will be either October 25 or November 6. The dates in the right-hand margin are a rough guide that may have to be modified. Because some topics span more than one lecture, not every lecture date is listed in the margin. The Hamilton (1994) book is a comprehensive reference, probably worth buying even though we use only parts of it in this course. The Bauwens, Lubrano, and Richard (1999) book is closer in approach to this course than is Hamilton's but because of its variations in mathematical level and choice of topics only parts of it are assigned reading. Schervish (1995) is at a higher mathematical level than this course, but is an excellent book and worth purchasing if you contemplate research in econometrics. Much of it assumes knowledge of basic measure theory. Robert (1994) is a theoretically oriented Bayesian statistics textbook. Gelman, Carlin, Stern, and Rubin (1995) is a more applied Bayesian statistics book. It has a more thorough treatment of some topics we will cover (such as Markov Chain Monte Carlo methods) than does Bauwens et al, but has no econometric examples or applications. Buying both Gelman et al and Bauwens et al would be a luxury, though a possibly useful one. Note that in the list of citations, URL's are in some cases displayed without a necessary preamble: `http://eco-072399b.princeton.edu/yftp/`. If the dvi or pdf files are displayed on a computer screen, clicking on the URL's should take you to the correct location, but you won't see the full URL in a printed version of this document.

(1) Bayesian Preliminaries 9/13
   (a) The course will reflect a Bayesian perspective on inference and will assume familiarity with it at least at the level of last year's lectures on the topic in 517, for which the notes are listed below. The only readings here that are required are the lecture notes (if you were not in 517 last year) and the Hildreth paper.

   (Sims, 2000a)
   (Berger and Wolpert, 1988)
   (Sims and Zha, 1998b, sections 1, 2 ,4-6)
   (Schervish, 1995, sections 1.1-1.4, 2.1-2.3,3.1-3.2)
   (Robert, 1994, p.?)
   (Hildreth, 1963)
   (Sims and Uhlig, 1991)

(2) Data Summary vs. Structure
   (a) Structural models vs. "reduced form" models
   (b) Calibration vs. "estimation"
   (c) Looking for a true model vs. characterizing flaws of false models

(Schorfheide, 1998)
(Sims, 1996)
(Rissanen, 2001, optional)

(3) Avoiding unintentional implications of standard or convenient or flat priors 9/18
  (a) Jeffreys Priors. Problems with it for:
    (i) Multivariate models
    (ii) The univariate AR
  (Schervish, 1995, section 2.3.4)
  (Bauwens, Lubrano, and Richard, 1999, Chapter 6)

(4) Mechanics of priors and posteriors for linear Gaussian models
  (Bauwens, Lubrano, and Richard, 1999, section 2.7)

(5) High-order and multivariate AR models 9/20,25
  (a) Review of multivariate linear stochastic difference equations (some of this to be reviewed in precept rather than lecture)
    (i) Roots to qualitatively characterize models
    (ii) Fundamental vs. non-fundamental MA representations
    (iii) Impulse response functions
      (A) Impulse responses vs. ACF's as data summaries
    (iv) Exogeneity, Granger causality, Wold and Granger causal orderings
  (Hamilton, 1994, Chapters 1-3,10.1-10.3)

(6) ARMA models 9/27
  (a) A linear space, unlike AR's; dense in L_2, like AR's.
  (b) Peculiarities of their likelihood function.

(7) Kalman filter and smoother 10/2,10/4
  (a) KF estimation of ARMA models
  (b) The natural rate
  (c) Time-varying parameters in forecasting VAR's
  (Hamilton, 1994, Chapter 13)

(8) Modeling initial conditions and "trend" 10/9,11
  (a) High-order AR + conditioning on initial conditions + flat prior $\Rightarrow$ belief in likely historical uniqueness of sample start date
  (b) Unit roots
  (c) Cointegration
  (Sims, 2000b)
  (Sims, 1989)
  (Sims, revised 1996)
  (Hamilton, 1994, section 19.1)

(9) Dummy-observation priors for VAR's 10/16
  (Sims and Zha, 1998a)
  Notes: Dummy observation priors

(10) Inference: formulating, using, testing restrictions or priors on VAR's 10/18,23
  (a) Recursiveness restrictions

(i) Exogeneity and likelihood structure
(Bauwens, Lubrano, and Richard, 1999, sections 2.6, 5.2.1-2)

(b) Priors and restrictions for structural VAR's
(i) Litterman/Leeper/Sims/Zha
(ii) Long run restrictions
(iii) Priors on impulse responses
(iv) Reduced form vs. structural parameters as space for prior
(A) Jeffreys priors
(Hamilton, 1994, Chapters 11, and 9, section 12.2)
Notes: "Granger Causality" (There is some redundancy between these notes and the set below.)
Notes: Likelihood for VAR systems
Blanchard and Quah (1989)
Leeper, Sims, and Zha (1996)
Sims and Zha (1998a)
Sims and Zha (1998b)

(11) Bayesian asymptotics: using Gaussian approximation to the likelihood as a computational shortcut 10/25

(12) Testing restrictions: Schwarz and Akaike criteria, model selection

(13) Instrumental variables 11/6
(a) Exact Bayesian interpretation in models with joint normality
(b) Weak instruments
Notes: "Testing Restrictions and Comparing Models"
(Schervish, 1995, sections 4.1-4.2, 4.6)
Kwan (1998)
Sims (2001)

(14) Importance Sampling, Metropolis-Hastings MCMC 11/8,13
(Hamilton, 1994, section 12.3)
Gelman, Carlin, Stern, and Rubin (1995), Chapter 11
Notes: "Proof of Fixed Point Property for Metropolis Algorithm"
(a) Stochastic volatility, ARCH
(Hamilton, 1994, Chapter 21)
Kim, Shephard, and Chib (1998)

(15) Hidden Markov chain models 11/15
(a) Structural breaks
(b) Regime shifts
(c) Approximation to parameter change and stochastic volatility models
Hamilton (1994), Chapter 22
Chib (1996)

(16) Panel data VAR's 11/20
Canova and Ciccarelli (2001)

(17) Frequency domain analysis 11/22,27

Notes: Frequency domain

(18) Seasonality 11/29
(19) Structural VAR's in practice 12/4
(20) Bayesian and classical time series asymptotics 12/6,11
(21) Allowance for slippage in the lecture schedule 12/13

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