COURSE DESCRIPTION

Part A of the course covers methods of inference for
- Stationary Linear Time Series Models
- VAR’s
- Estimation of DSGE models
- Nonlinear Time Series Models (Time Permitting)

Part B of the course discusses methods of inference for
- Classical Nonlinear Models: We give a general discussion of the consistency and asymptotic normality of M (maximum or minimum) - estimators. Subsequently we focus our discussion on the following leading cases: nonlinear least squares, maximum likelihood estimation and generalized method of moments estimation. We also discuss numerical optimization methods.
- Static and Dynamic Panel Data Models: We consider fixed effects and random effects specifications.
- If time permits, we will also discuss quantile regression, and non-parametric/ semi-parametric estimation methods.
ASSUMED REQUIREMENTS

Students are assumed to have knowledge of the fundamental concepts in probability and statistics at the level of textbooks by Casella and Berger, Statistical Inference, Duxbury Press, and Hogg, McKean and Craig, Introduction to Mathematical Statistics, Prentice Hall. They are furthermore assumed to have knowledge of the material covered in ECON 623, including basic knowledge of asymptotic theory. Students are also assumed to have a strong background in linear algebra and in the solution of difference equations.

PRINCIPAL TEXTS


SUPPLEMENTARY TEXTS


TOPICS

Part A: (required lit given below)
- Introduction to Time Series – *Handout, H*
- Basic Asymptotics of Time Series -- *Handout, Dav*
- Analysis of Stationary Linear Time Series Models (Time domain) – *Handout, H, BD*
- VAR’s - *Handout, H*
- Bayesian VAR’s - *Handout, H*
- State Space Models –*Handout, Ham*
- MCMC, Estimation of DSGE models -*Handout, Ham*
- Volatility Models – BEN

Part B: (required lit given below)
- Classical Nonlinear Models
- Estimation of Panel Data Models
- LAD and Quantile Regression

ADDITIONAL ECONOMETRICS TEXTS AND REFERENCES

In addition to the above texts, below is a list of additional texts that may be helpful as background reading.

PART A

Part B

A general list of econometrics texts is maintained on
http://econweb.umd.edu/~prucha/Handouts_General/Textbooks/Textbooks.pdf
GRADING POLICY

Parts A and B of Econ 624 will, respectively, be graded based on

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
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<tbody>
<tr>
<td>Homework</td>
<td>15%*</td>
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<tr>
<td>Exam</td>
<td>35%**</td>
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* Homework problems will consist of theoretical problems and of computer problems. Homework needs to be handed in to the TA, on the specified due date and in person before or after the lecture. Homework problems that are handed in one day late lose 25 percent of the points they would otherwise have received. No points are awarded for homework that is more than one day late. (Homework problems that are not handed in person, but slipped under the door or put in the mailbox of the TA, etc., are not considered as handed in until they are found!!).

Instructions specific to Part A: Homework for Part A consists of weekly assignments. Students are encouraged to work in groups but the final answer needs to be written down individually (not copied from someone else or from another source). Plagiarism rules apply to homework: if you are using source materials you need to cite the source. The purpose of the homework is to give you sufficient practice to learn the material, not to assess your knowledge of the material (this is done in the exam). It is important to invest enough effort in the problem sets while also balancing this with requirements for other courses.

** No makeup exams will be given except in cases of illness (confirmed by a doctor’s certificate), religious observance, participation in University activities at the request of the University authorities, or compelling circumstances beyond the student's control. If at all possible, the student must inform us (or the Economics Department) of her/his situation before the exam.

In case the University is closed during (part of) the official scheduled time period for the final exam, the exam will be rescheduled according to the instructions that will be given by the University in that eventuality.

MIDTERM: Thursday, March 15, 2018, 12:30-1:45pm, in class, open book.
FINAL EXAM: Thursday, May 17, 2018, 1:30-3:30pm
**Academic Integrity**

The student-administered University Honor Code and Honor Pledge (shc.umd.edu/code.html) prohibits students from cheating on exams, plagiarizing papers, submitting the same paper for credit in two courses without authorization, buying papers, submitting fraudulent documents and forging signatures. On every examination students must write by hand and sign the following pledge,

“I pledge on my honor that I have not given or received any unauthorized assistance on this examination or assignment.”

Compliance with the code is administered by the Student Honor Council, which strives to promote a community of trust on the College Park campus.

**Copyright Protection for Class Materials**

The lecture class and all other course materials that exist in a tangible medium, such as written or recorded lectures, Power Point presentations, handouts and tests, are copyright protected. Students may not copy and distribute such materials except for personal use and with the instructor’s permission.

**Attendance**

By signing up for this class you agree to exam formats, course requirements and timing of exams and due dates of work to be handed in. Attendance in all lectures is expected.

**Students with Disabilities**

UMD guarantees appropriate accommodations for students with disabilities. If you require accommodations, please contact me as soon as possible. If you need further clarification, the link to DSS is: http://faculty.umd.edu/teach/specialneeds.html

**COURSE EVALUATIONS**

Students are encouraged to submit course evaluations through CourseEvalUM (www.courseevalum.umd.edu).

**TEACHING ASSISTANT**

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Office Hours: TBD
COURSE OUTLINE AND TIME TABLE FOR PART A
(R)...background reading

REVIEWS

1. Asymptotic Theory
   (R) Handout “Asymptotic Theory” – independent study

2. Introduction to Time Series
   (1 lecture)
   Handout
   References:
   Brockwell/Davis, Chapter 1
   Hamilton, Chapter 3
   • Nelson, C. and C. Plosser (1982), "Trends and Random Walks in
     Macroeconomic Time Series," Journal of Monetary Economics 10, 139-162.

3. Basic Asymptotics for Time Series
   (2 lectures)
   Handout

4. Analysis of Stationary Linear Time Series Models
   (2 lectures)
   Handout
   References:
   Brockwell/Davis, Chapters 2, 3, 8-10
   Hamilton, Chapters 1-3, 5
   • Andrews and Ploberger (1996), "Testing for Serial Correlation Against an
     ARMA(1,1) Process," Journal of the American Statistical Association 91: 1331-
     1342.
   • Breusch (1978), "Testing for Autocorrelation in Dynamic Linear Models,"
   • Godfrey (1978), "Testing Against General Autoregressive and Moving Average
     Error Models when the Regressors include Lagged Dependent Variables,"
   • Pötscher, B.M. (1990): "Estimation of Autoregressive Moving-Average Order
     Given an Infinite Number of Models and Approximation Of Spectral Densities,"
   • Andrews (1991), "Heteroskedasticity and Autocorrelation Consistent
     Covariance Matrix Estimation,” Econometrica, 59, 817–858
     Simple Autocorrelation Robust Tests,” Econometrica, 72, 937-946.


5. **VAR’s**

(3 lectures)

Handout

References:

• Hamilton, Chapter 11, 12
• Lütkepohl, Chapters 2-5, 9
• Brockwell/Davis, Chapter 11
• Christiano, L., M. Eichenbaum, and R. Vigfusson, (2006), Assessing Structural VARs, manuscript.
• Chari, V.V., P.J. Kehoe and E.R. McGrattan (2007), Are Structural VARs with Long-Run Restrictions Useful in Developing Business Cycle Theory? Federal Reserve Bank of Minneapolis Research Department Staff Report 364.
• Sims and Zha(1999), "Error Bands for Impulse Responses", Econometrica, vol 67, no. 5, pp 1113-1156
• Stock and Watson (2016), "Factor Models and Structural VARs in Macroeconomics", mimeo.


6. Estimation of DSGE Models
(3 lectures)

• An, S and F. Schorfheide (2007), Bayesian Analysis of DSGE Models, Econometric Reviews, 26: 113-172.

7. Volatility Models
(1 lecture)
References:

• Hamilton, Chapter 21
8. **Structural Break**  
(1 lecture)

References:

- Hamilton, Chapter 22

9. **Analysis of Nonstationary Linear Time Series Models (Unit Root Tests, Cointegration Analysis)**  
(1 lecture, time permitting)
COURSE OUTLINE AND TIME TABLE FOR PART B

I. CLASSICAL NONLINEAR MODELS
   (R) Handout on “Classical Nonlinear Models”

1. Consistency and Asymptotic Properties of M-Estimators
   (2 lectures)
   (R) A: Ch.4.1; P: Ch. 3,7,8; W: Ch. 12.1-12.3; Bierens: Ch. 4.2

2. Nonlinear Least Squares
   (2 lecture)
   (R) A: 4.3; Bierens: Ch. 4.1, 4.3; G: Ch. 7

3. Maximum Likelihood Estimation
   (2 lectures)
   (R) A: Ch. 4.2; P: Ch. 11.1; Bierens: Ch. 4.5; G: Ch. 14

4. Generalized Method of Moments Estimation
   (2 lectures)
   (R) P: Ch. 11.2; W: Ch. 14; G: Ch. 13

5. Numerical Optimization Methods
   (1 lectures)
   (R) W: Ch. 12.7

II. PANEL DATA MODELS
(5 lectures)
   Fixed and random effects panel data models, dynamic panel data models,
   asymptotic properties.
   (R) Handout on “Estimation of Panel Data Models”
   References in handout.

   Prucha, I.R., On the Asymptotic Efficiency of Feasible Aitken Estimators
   for Seemingly Unrelated Regression Models with Error Components,
   Econometrica, 52(1), 1984, 203-207.

   Prucha, I.R., Maximum Likelihood and Instrumental Variable Estimation
   in Simultaneous Equation Systems with Error Components, International
III. QUANTILE REGRESSION MODELS

(2 lectures)
Median and quantile regression, least absolute deviation estimator, two stage least absolute deviation estimators, asymptotic properties.

(R) Handout on “Quantile Regression Models”
References in handout.

IV. NON-PARAMETRIC ESTIMATION

(2 lectures, if time permits)
Kernel methods, density estimation, regression
Texts: