UNIVERSITY OF MARYLAND
Department of Economics

GUIDO KUERSTEINER
INGMAR R. PRUCHA

ECON 624
Spring 2016

Office: KUERSTEINER: Tydings Hall 3145
kuersteiner@econ.umd.edu
http://econweb.umd.edu/~kuersteiner/
PRUCHA: Tydings Hall 3147A
prucha@econ.umd.edu
http://econweb.umd.edu/~prucha/
Lecture: Tu/Th 12:30-1:45pm (TYD 0101)
Discussion: Th 5:30-7:15pm (TYD 2108)
Office Hours: KUERSTEINER Tu: 3-5pm (and by appointment)
PRUCHA Th 3-5pm (and by appointment)

ECONOMETRICS II

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

Green, W.A., *Econometric Analysis*, 7th edition, Prentice Hall, 2011. (G)
Hamilton, J. *Time Series Analysis*, Princeton Univ. Press, 1994. (H)

SUPPLEMENTARY TEXTS

Baltagi, B.H., Econometric Analysis of Panel Data, Wiley, 2013. (B)
Wooldridge, J.M., Econometric Analysis of Cross Sectional Panel Data, MIT Press, 2010. (W)

TOPICS

Part A: (required lit will be updated later.)

- 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

- Bolleslev, T. R. Engle, D. Nelson, Arch Models, Handbook of Econometrics Vol 4, Chapter 49, North Holland, 1994.
  (BEN)
- Brockwell, P.J. and E.A. Davis, Time Series: Theory and Methods, 2nd ed. Springer-Verlag, 1993.
  (BD)
- Davidson, J., Stochastic Limit Theory, Oxford University Press, 1994.
  (Dav)
- Hamilton, J., State Space Models, Handbook of Econometrics, Vol 4, Chapter 50, North Holland, 1994.
  (Ham)

- Watson, M., Vector Autoregression and Cointegration, Handbook of Econometrics, Vol 4, Chapter 47, North Holland, 1994.
  (Wat)

Part B

- Amemiya, T., Advanced Econometrics, Harvard University Press, 1985.
  (A)
- Arellano, M., Panel Data Econometrics, Oxford University Press, 2003.
- (AR)
- Bierens, H., Topics in Advanced Econometrics, Cambridge University Press, 1996.
- (B)
- Cameron, A.C., and P.K. Trivedi, Microeconometrics: Methods and Applications, Cambridge University Press, 2005.
  (C)
- Hsiao, C., Analysis of Panel Data, Cambridge University Press, 2014. (H)
- Poetscher, B.M., and I.R. Prucha, Dynamic Nonlinear Econometric Models, Springer Verlag, 1997.
  (P)
- Wooldridge, J., Econometric Analysis of Cross Section and Panel Data, MIT Press, 2010 (W).

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

Homework	15%*
Exam	35%**

* 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. Home work problems that are handed in one day late lose 25 percent of the points they would otherwise have received. No points are awarded for home work that is more than one day late. (Home work problems that are not handed in person, but slipped under the door or put in the mail box of the TA, etc., are not considered as handed in until they are found!!).
Instructions specific to PartA: 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). 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 Tuesday, March 22, 2016, 12:30-1:45pm, in class, open book.
FINAL EXAM: Tuesday, May 17, 2016, 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

Name: Sungho Noh
Room: TYD 3115N
Email: Noh@econ.umd.edu
Office Hours: We: 1-3pm

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," Australian Economic Papers 17: 534-355.
- Godfrey (1978), "Testing Against General Autoregressive and Moving Average Error Models when the Regressors include Lagged Dependent Variables," Econometrica 46: 1293-1303.
- Pötscher, B.M. (1990): "Estimation of Autoregressive Moving-Average Order Given an Infinite Number of Models and Approximation Of Spectral Densities," Journal of Time Series Analysis, Vol. 11, No 2, p.165-179.

5. VAR's

(3 lectures)
Handout
References:

- Hamilton, Chapter 11, 12
- Lütkepohl, Chapters 2-5,9
- Brockwell/Davis, Chapter 11

- Blanchard, O. and D. Quah (1989), The Dynamic Effects of Aggregate Demand and Supply Disturbances, American Economic Review, 655-672.
- Bernanke, B.S., and A.S. Blinder (1992), The federal funds rate and the channels of monetary transmission , American Economic Review 82(4):901-921.
- Canova, Fabio and Gianni De Nicolo (2002): "Monetary Disturbances Matter for Business Cycle Fluctuations in the G-7," Journal of Monetary Economics, 49, 1131-59.
- Christiano, L., M. Eichenbaum, and C. Evans (1999). Monetary policy shocks: What have we learned and to what end? Ch. 2 in J.Taylor and M. Woodford (ed.). In Handbook of Macroeconomics,Vol. 1A:65-148.
- Christiano, L., M. Eichenbaum, and R. Vigfusson, (2006), Assessing Structural VARs, manuscript.
- Chari, V.V., P.J. Kehoe and E.R. McGrattan (2007), Business Cycle Accounting, Econometrica 75, 781-836.
- 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.
- Engle, R. F., D. F. Hendry, and J.-F. Richard, (1983), Exogeneity, Econometrica, 51, 277-305.
- Faust, Jon (1998): "The Robustness of Identified VAR Conclusions about Money," Carnegie- Rochester Conference Series on Public Policy, 49, 207-244.
- Granger, C. W. J. (1980), Testing for Causality: A Personal Viewpoint, Journal of Economic Dynamics and Control, 2, 329-352
- Granger, C. W. J. (1989), Modelling Economic Series, Oxford: Oxford University Press.
- Hendry, D. F. (1995), Dynamic Econometrics, Oxford: Oxford University Press.
- Jordà, O (2005) "Estimation and Inference of Impulse Responses by Local Projections," American Economic Review, March.
- Killian, L. (1998), Small-sample confidence intervals for impulse response functions , Review of Economics and Statistics 80(2):218-230.
- Schorfheide, F. (2000). Loss function-based evaluation of DSGE models. Journal of Applied Econometrics 15(6):645--670.
- Sims, C.A.(1972), "Money, Income and Causality," American Economic Review 62: 540-552.
- Sims, C.A.(1980), "Macroeconomics and Reality," Econometrica 48: 1-48.
- Sims and Zha(1999), "Error Bands for Impulse Responses", Econometrica, vol 67, no. 5, pp 1113-1156

- Uhlig, Harald (2005): "What Are the Effects of Monetary Policy on Output? Results from an Agnostic Identification Procedure," Journal of Monetary Economics, 52, 381-419.

6. Estimation of DSGE Models
(3 lectures)

- An, S and F. Schorfheide (2007), Bayesian Analysis of DSGE Models, Econometric Reviews, 26: 113-172.
- Schorfheide, F. (2000). Loss function-based evaluation of DSGE models. Journal of Applied Econometrics 15(6):645--670.

7. Volatility Models
(1 lecture)
References:

- Hamilton, Chapter 21

- Bollerslev, T., 1987. A conditionally heteroskedastic time series model for speculative prices and rates of return. Review of Economics and Statistics 69, 542--547.
- Engle, R.F., 1982. Autoregressive conditional heteroskedasticity with estimates of the variance of U.K. inflation. Econometrica 50, 987---1008.
- Engle, R.F., Lilien, D.M., Robins, R.P., 1987. Estimating time-varying risk premia in the term structure: the ARCH-M model. Econometrica 55, 391---407.
- Engle, R., Kroner, K., 1995. Multivariate simultaneous GARCH. Econometric Theory 11, 122-150.

8. Structural Break
(1 lecture)

References:

- Hamilton, Chapter 22

- Bai, J., Perron, P., 1998. Estimating and testing linear models with multiple structural changes. Econometrica 66, 47-78.
- Krämer, W., Ploberger, W., Alt, R., 1988. Testing for structural change in dynamic models. Econometrica 56, 1355-1369.
- Ploberger, W., Krämer, W., 1992. The CUSUM test with OLS residuals. Econometrica 60, 271-285.
- Ploberger, W., Krämer, W., Kontrus, K., 1989. A new test for structural stability in the linear regression model. Journal of Econometrics 40, 307-318.

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
(2lectures)
(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 Economic Review, 26(2), 1985, 491-506.

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.
Text: Koenker, R., Quantile Regression, Cambridge University Press, 2005.

IV. NON-PARAMETRIC ESTIMATION

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

Li, Q., and Racine, S.R., Nonparametric Econometrics: Theory and Practice, Princeton University Press, 2006.
Racine, J.S., Nonmarametric Econometrics: A Primer, Now Publishers Inc., 2008.
Yatchew, A., Semiparametric Regression for the Applied Econometrician, Cambridge University Press, 2003.