EC 821

Time Series Econometrics

Spring 1999

Tuesday-Thursday noon-1:15pm

Carney Room 2

Professor Jushan Bai Professor Serena Ng

Carney 147 Carney 238

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Office Hours: T, Th 10:30-11:30

The general objective of this course is to give student a firm grounding in modern time series analysis, with an emphasis on applications of interest to macroeconomists.

References

The course material consists of chapters from the book by

(JH) J.D. Hamilton Time Series Analysis, Princeton University Press.

(AH) Andrew Harvey, Time Series Models, MIT Press.

(MH) Michio Hatanaka, Time Series Based Economics: Unit Roots and Cointegration , Oxford University Press.

Some useful survey articles can be found in the Handbook of Econometrics , volumes II and IV, which are on reserve in the library.

Part A of the course (taught by Ng) focuses on stationary time series. Part B (taught by Bai) considers non-stationary and ARCH-GARCH models. The final grade will be an equally weighted average of the two parts, each evaluated separately.

Problem sets will consist of a mixture of theory and applied problems. The software Eviews is recommended for the applied problems, but feel free to use Gauss or Matlab , all available on FMRISC.

Evaluation for Part A:

Problem sets (3) 60%

Take home mid-term 40%

Part A: Stationary Time Series

Course Description

1. Basic Concepts: Difference Equations, Stationarity, Ergodicity, Autocovariance, and ARMA Models. (4 lectures)

JH, Ch. 1-2

AH, Ch. 1-2

2. Spectral Representation and Estimation (2 lectures)

JH, Ch. 6

AH, Ch. 6

Thomas Sargent, Macroeconomic Theory , Academic Press, Ch. XI.

Den Haan W. J. and A. Levin (1996), "A Practitioner s Guide to Robust Covariance Matrix Estimation", NBER Technical Working Paper 197.

Andrews, D. W. K (1991) "Heteroskadastic and Autocorrelation Consistent Covariance Estimation", Econometrica, 817-854.

3. Forecasting (2 lecture)

JH, Ch. 4

1. Dynamic Regression Models, Recursive Least Squares and the Kalman Filter (3 lectures)

JH, Ch. 7 and 8.

AH, Ch 4.

5. VARs, Causality, Exogeneity (2 lectures)

JH, Ch. 10-11

Handbook of Applied Econometrics , "Vector Autoregressive Models: Specification, Estimation, Inference and Forecasting" by Fabio Canova.

Structural VARs (1 lecture)

Blanchard, O. J. and D. Quah (1989), "The Dynamic Effects of Aggregate Demand and Supply Disturbances", American Economic Review, 79, 655-673.

Bernanke, B. (1986), "Alternative Explanations of the Money-Income Correlation", Carneige Rochester Conference Series on Public Policy, 25, 49-99.

Part B: Non-stationary and Non-Linear Time Series

Course Description

Unit Root Analysis

-Trend stationarity and difference stationarity

-Basics of Brownian motion process

-Unit root asymptotic theory and test statistics

Cointegration Analysis

-Conceptual Framework

-Representation Theorems

-Residual based test of cointegration

-Maximum likelihood inference

Some Nonlinear Time Series Models

-Time series heteroskedasticity: ARCH, GARCH

-Stochastic Volatility

-Multiple regimes and Markov Switching

6. Unit Roots

JH, Ch. 15-17

***Handbook of Econometrics* , Volume 4 Chapter 46: Unit Roots, Structural Breaks, and Trends, by James Stock**

7. Cointegration

JH, Ch. 18-20

***Handbook of Econometrics* , Vol. IV, Chapter 47: Vector Autoregressions and Cointegration, by Mark Watson**

8. Structural Change

Andrews, D. (1993) "Tests for parameter instability and structural change with unknown change point" *Econometrica* , 821-856.

Stock, J.H. and M.W. Watson (1996) "Evidence on structural instability in macroeconomic time series relations" *Journal of Business and Economic Statistics* , 1-10.

***Handbook of Econometrics* , Vol. IV, Chapter 46: Unit Roots, Structural Breaks, and Trends, by James Stock.**

9. Non-Linear Models of the Business Cycle

Hamilton, J.D. (1989), "A new Approach to the Economic Analysis of Non-Stationary Time Series and the Business Cycle", *Econometrica* , 57, pp. 357-384.

Koop, G.K., and P. Beaudry (1993) "Do Recessions permanently Change Output?", *Journal of Monetary Economics* , 149-163.

Potter (1995) "A nonlinear approach to U.S. GNP," *Journal of Applied Econometrics* , 109-125.

Terasvirta, T., and H.M. Anderson (1992), "Characterizing Nonlinearities in Business Cycles Using Smooth Transition Autoregressive Models", *Journal of Applied Econometrics* , S119-S136.

***Handbook of Econometrics* , Vol. IV, Chapter 48: AAspects of Modelling Nonlinear Time Series,@ by Timo Terasvirta, Dag Tjostheim and Clive Granger.**

10 . ARCH and Stochastic Volatility

JH Ch. 21

AH Ch. 8

Bollerslev, T., R.Y. Chou, and K. F. Kroner (1992), "ARCH Modeling in Finance: A Review of the Theory and Empirical Evidence", *Journal of Econometrics* , 52, 5, pp. 5-59.

***Handbook of Econometrics* , Vol. IV, Chapter 49: Arch Models, by Tim Bollerslev, Robert Engle, and Daniel Nelson.**