Time Series Analysis

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Course description: This course introduces statistical methods appropriate when sample observations are not independent, but rather, are logically ordered. Coverage will begin with the traditional ARIMA (Box-Jenkins) approach to time series analysis, and proceed through dynamic modeling and regression approaches to recent developments such as cointegration analysis, error correction models, and vector autoregression.

Heavy emphasis will be given to fundamental concepts and applied work. Prerequisites for the course include a solid understanding of the fundamentals of statistical inference, regression analysis, matrix algebra, and the general linear model.

Course requirements and evaluation:

There will be four homework assignments and an exam. Grades will be based on the top 3 homework scores and the exam score, with each receiving equal weight. Homework assignments will include statistical problems and computer assignments requiring the use of statistical software. SAS, Stata, and E-Views will be used for various applications to give students a sense of the comparative strengths and weakness of different packages.

Required Texts:


Recommended texts:


**see end for other useful texts and articles**
Course Sequence and Readings (dates are approximate)

Introduction (July 23)
  Why you’re here
  Put another way, time series vs. cross-sectional data
  Review of generalized least squares
  Fixing error terms vs. fixing the specification
  Classical decomposition and smoothing.

Reading
  Diebold, 1998
  Cromwell et. al. (1993), ch. 1
  Enders, pp. 1-6
  Charemza and Deadman, ch. 1
  Review of Generalized Least Squares in any good statistics text, if needed
  Downs and Rocke, 1979

PART I: The ARIMA (Box-Jenkins) Approach

Univariate ARIMA models, impact assessment, and forecasting (July 24-30)
  Stationarity, trend and drift
  Autoregressive processes
  Moving average processes
  The autocorrelation and partial autocorrelation functions
  Identifying ARIMA models
  Estimating ARIMA models
  Forecasting
  Impact assessment

Reading
  McCleary and Hay, ch. 1-4,6
  Enders, ch. 4 to p. 225, ch. 2 (in that order)
  Cromwell et. al. ( 1993) Univariate Tests..., pp. 10-18
  Hamilton, pp. 25-33 (lag operators)
  Charemza, sections 5.1-5.4

Transfer functions and intervention analysis (July 31, Aug. 1)
  The crosscorrelation function and identification
  Prewhitening

Reading
  McCleary and Hay, ch. 5
  Enders, ch. 5 through p. 261
  Wood 1988
ARCH models (Aug. 2)

Readings
Gujarati, pp. 856-862
Enders, Ch. 3
Engle 2004

PART II: Regression analysis of time series (August 3-9, exam Aug. 10)

GLS, Comfac, and Autoregressive Distributed Lag models

Review of GLS
COMFAC
The Koyck and Almon lag models
Lagged Dependent Variables reexamined
Newey-West Standard Errors

Readings
Gujarati, Ch. 12, if needed
Hibbs 1974
Hendry and Mizon 1978
Mizon 1995
Gujarati, Ch. 17
Rueda 2005
Beck 1985
Achen 2000

Time series dynamics

Skepticism concerning traditional methodology
Davidson, Hendry, Serba and Yeo as a turning point
Testing for parameter constancy

Readings
Charemza, Ch. 2-3, Section 4.1

Cointegration, Unit Roots and Error Correction Models (ECM)

Cointegration
Error Correction Models

Readings
Murray 1994
Granger 2004
Charemza, sections 5.5-5.8
Enders, ch. 6 through p. 366
Barabas 2004

EXAM APPROXIMATELY HERE

Vector Autoregression (VAR)
Review of Simultaneous Equations Modeling
Principles of VAR
VAR and causality, Granger causality
VAR and cointegration

Readings
Wonnacott and Wonnacott ch. 7-9, 17-20, if needed
Brandt & Williams, pp. 1-32, 59-65 (Intro to VAR, example)
Brandt & Williams, pp. 56-58 (Criticisms of VAR)
Brandt & Williams, pp. 32-36, 65-66 (Granger Causality)
Brandt & Williams, pp. 36-50, 68-70 (Impulse Response Functions)
Brandt & Williams, pp. 50-56 (Vector ECM)
Enders, Ch. 5, pp. 264-end
Charemza, Ch. 6
Sims 1980

Exogeneity, Encompassing and Model Selection

Readings
Charemza, Ch. 7-8
Enders, pp. 366-372
Pagan 1987
Geweke 1984
Leamer 1983

PART III: Special Topics (if time permits)

Pooled Cross-Section and Time-Series Models

Readings
Stimson 1985
Beck and Katz 1995
Wawro 2002
Other useful texts:


**Articles**


