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COURSE DESCRIPTION:
Many of the data sets that social scientists analyze are organized over time including leader approval, GDP per capita, homicide rates, and political violence. While many of the tools that students learn in regression courses are useful for analyzing time series data, there are several unique properties of time series data that must be understood before working with such data. This course provides an introduction to methods of time series analysis, building upon students’ background knowledge in statistical inference and regression analysis. We begin with basic descriptive methods for viewing time series data and then talk about stationarity assumptions and how violations of these assumptions threaten inferences in regression analyses of time series data. Students will also learn about autoregressive integrated moving average (ARIMA) models, including autocorrelation (ACF) and partial autocorrelation (PACF) functions. We will review several statistical tests for unit roots, serial correlation, and normality. Students will be introduced to regression based time series models, such as the autoregressive distributed lag (ADL) model. We will also learn about modeling interventions in time series data. More advanced models that will be covered include cointegration, error correction models (ECM), vector autoregression (VAR) models, and time varying parameter models. In addition to learning about tests and models for single time series, the course will introduce students to pooled time series models including panel unit root tests and models that capture fixed or random effects.
COURSE REQUIREMENTS:
Each student is expected to attend all class meetings and to have completed all required readings prior to each class. The course grade will be based on four homework assignments throughout the semester. We will be using STATA, which is available in the Newberry computer lab. We will also provide instructions for doing the assignments in R. We will provide time series datasets that you can use for the assignments on the shared drive. In addition to providing sample code for each assignment, the TAs will be available to assist with the assignments.

We will use a straightforward grading scale for the assignments:
4 – Excellent, 3 – Good, 2 – Fair, 1 – Unsatisfactory

REQUIRED TEXTS:
Assigned articles (marked with *) will be available through CTools, along with lecture slides and assignments.

RECOMMENDED TEXT:

OTHER USEFUL TEXTS:


**CLASS SCHEDULE:**

**June 26**

Introduction to Time Series Analysis

**Prof. Webb**

**Required Reading**

BFHP, Chapter 1

**Recommended Reading**

Enders, Chapter 1, sections 1-6 and 9


June 27 & 28  
**Univariate Time Series Tests & ARIMA Models**  
Prof. Webb  
Receive Assignment #1 (due July 3)

**Required Reading**  
BFHP, Chapter 2, pp. 22-58  
BFHP, Appendix  

**Recommended Reading**  
BFHP, Appendix  
Enders, Chapter 2, through section 2.10  
Granger and Newbold (1986), Chapter 3 & 5.  
McCLEary and Hay (1980).  
McDowall et al (1980), pages 1-54  

June 29 & July 2  
**Unit Root Tests**  
Prof. Webb  
Receive Assignment #1 (due July 3)

**Required Reading**  
BFHP, Chapter 5  

**Recommended Reading**  
Enders, Chapter 4  

July 3  
**ARCH/GARCH Models**  
Prof. Webb  
Receive Assignment #2 (due July 9)
Required Reading
BFHP, Chapter 7, pp. 181-187
*Enders, Chapter 3

Recommended Reading
Harvey (1989, 1993)

July 4  No Class
July 5  Intervention Analysis & Structural Breaks  
Prof. Webb  
Required Reading  
BFHP, Chapter 2, pp. 58-67  
   American Political Science Review 98(3): 515-528.  

Recommended Reading  
Enders, Chapter 5, pages 259-281  
   American Political Science Review 74(3): 745-756.  
   Political Methodology 7(1): 43-69.  
   American Political Science Review 80(3): 819-842.  
   American Political Science Review 80(3): 921-945.  

July 6  Dynamic Regression Models  
Prof. Webb  
Required Reading  
BFHP, Chapter 3  
   Political Analysis. 14:186-205.  

Recommended Reading  
   Political Methodology. 11:71-89.
Enders, Chapter 5, pages 272-294
Granger and Newbold (1986), Chapter 5.

July 9

Prof. Mitchell
Near and Fractional Integration

Required Reading

Recommended Reading
July 10 & 11

Cointegration and Error Correction Models

Prof. Mitchell

Required Reading

BFHP, Chapter 6
Enders, Chapter 6


Recommended Reading


July 12 Panel Unit Root & Panel Cointegration Tests
Prof. Mitchell Receive Assignment #3 (due July 16)
Required Reading


July 13 & 16 Vector Autoregression (VAR) and Granger Causality
Prof. Mitchell Receive Assignment #4 (due July 19)
Required Reading
BFHP, Chapter 4
Brandt and Williams, Chapters 1-3


**Recommended Reading**


Enders, Chapter 5 (pages 297-329)


Granger (1991), Chapters 8, 10 (Sims, Todd)

Hendry (1995)


Mills (1990), pp. 281-305


**July 17**

**Time Varying Parameter Models**

**Prof. Mitchell**

**Required Reading**

BHFP, Chapter 7, pages 205-212


**Recommended Reading**


**Enders, Chapter 2, pages 102-108, Chapter 7, pages 420-449**


**July 18 & 19**

**Pooled Time Series**

**Prof. Mitchell**

**Required Reading (Pooled Times Series)**


**Recommended Reading**

**Special Issue of *Political Analysis*, “From Statistical Nuisances to Serious Modeling: Changing How We Think About the Analysis of Time-Series–Cross-Section Data.” 2007, Volume 15, Number 2.**


July 20

Event Count Models

Prof. Mitchell

Required Reading (Event Count Models)