MSF 8520: Time Series & Applied Business Forecasting

Fall 2006;
T, Th 1:00-2:15 pm

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Office Hours: T, Th 2:30 – 5 pm (or by appointment)

Textbook(s)
Required:

Not Required: Additional texts will also be used at various times throughout the semester. They are not required, and are on reserve at the library.

Course Objectives
This course will primarily focus on the econometric techniques used to analyze and forecast time series data. Issues unique to financial data and estimation of models will be discussed in a univariate and multivariate context.
The course will proceed in two related paths: theory and application. The techniques will first be presented in an intuitive pencil-paper approach, followed by an application utilizing real financial data and the computer. Understanding both approaches are essential to understanding the material.

Grading
• Final exam (35%)
• Two midterm exams (1st exam: 10%, 2nd exam: 20%)
• Class project (35%) – More on this later
**Academic Integrity Policy**

The Code of Academic Integrity of Villanova University addresses cheating, fabrication of submitted work, plagiarism, handing in work completed for another course without the instructor’s approval, and other forms of dishonesty. For the first offense, a student who violates the Code of Villanova University will receive 0 points for the assignment. The violation will be reported by the instructor to the Dean’s Office and recorded in the student’s file. In addition, the student will be expected to complete an education program. For the second offense, the student will be dismissed from the University and the reason noted on the student’s official transcript.

**Course Outline**

- **Classical Linear Regression Analysis / Preliminaries**
  - Refresher / Review (Chs 1-4, Kennedy)
  - SAS introduction (setup & run simple programs)

  *First Exam will only deal with these topics!*

- **Introduction to Time Series**
  - A look at the data (Ch 1, Tsay; Ch 1, Chan)
    - Additional Data structures
    - Review distributional moments and empirical properties of asset returns
    - Trends, Seasonal Cycles, Transformations
  - Linear Algebra (Appendix B, CWS)
    - Applications: OLS, Solving sets of linear equations (useful for VARs)

- **Linear (Univariate) Time Series Analysis** (Ch 2, Tsay; Ch 3 & 4, Chan)
  - Stationarity & unit roots
  - AR, MA, ARMA, & ARIMA models
  - Seasonality / forecasting

- **Conditional Heteroscedastic Models** (Ch 3, Tsay; Ch 9, Chan)
  - Characteristics of volatility
  - ARCH & GARCH modeling, testing, & forecasting

- **Multivariate Time Series Analysis** (Ch 8 & 9, Tsay; Ch 10 & 12, Chan)
  - VAR, VMA, and VARMA models
  - Identification
  - Co-Integration & Error-Correction

- **Markov Chain Monte Carlo Methods & State Space Models** (Ch 10, Tsay; Ch 11, Chan)
  - State Space Representations (review of Markov Chains)
  - Kalman Recursions
  - Markov Switching Models