

EC 794: Financial Econometrics
Spring 2009

Instructor: Zhongjun Qu

Time and Location: Mon and Wed 2:00-3:30; Room 315, 270 Bay State Road

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Office Hours: Tuesday 2:30-3:30, Wednesday 3:00-5:00

Course Overview

This course is designed to provide an in-depth discussion of econometrics methods used for the study of financial markets. The audience is Ph.D students working in the area of econometrics, finance and applied macroeconomics. The topics include prediction of asset returns, financial volatility, asset allocation, value at risk, and high frequency data analysis. The goal is two fold. The first goal is to familiarize students with the important econometric methods and to put them in a position to do their own research. The second goal is to expose students to new research ideas and to help them to develop their thesis in related fields.

Requirements

There will be a referee report, a forty-five-minute presentation, and a final exam (you can choose between taking the exam and writing a paper. The due date of the paper is the same as that of the final exam). The referee report accounts for 20% of the grade, the presentation 30%, and the exam (or the paper) 50%.

Tentative Dates for Exams

The final exam will be held in the final exam week.

Texts

We will use a mix of lectures and selected chapters/sections from the following publications:

- Campbell, J.Y., Lo, A.W. and C. Mackinlay (1997), *The Econometrics of Financial Markets*. Princeton University Press.
- Singleton, K.J. (2006), *Empirical Dynamic Asset Pricing: Model Specification and Econometric Assessment*. Princeton University Press.
- Taylor, S.J. (2005), *Asset Price Dynamics, Volatility, and Prediction*. Princeton University Press.
- Tsay, R.S. (2002), *Analysis of Financial Time Series*. Wiley.

Academic Conduct

Students should know and understand the CAS Academic Conduct Code. Copies of the CAS Academic Conduct Code are available in room CAS 105. Any suspected academic misconduct would be reported to the Dean's Office.

COURSE OUTLINE

Chapter 1: The Prediction of Asset Returns (Weeks 1-2)

The Random Walk Hypothesis

Test of Random Walk Hypothesis

Long Horizon Predictivity

Recent Empirical Evidence

Readings: Taylor (2005), Chapters 4-7; Campbell, et. al. (1997), Chapter 2

Chapter 2: Market Microstructure (Week 3)

Bid-Ask Spread

Modelling Transaction Data

Readings: Campbell, et. al. (1997), Chapter 3

Chapter 3: Capital Asset Pricing Model (Week 4)

Campbell, et. al. (1997), Chapter 5.

Chapter 4: Intertemporal Equilibrium Models (Weeks 5-6)

Campbell, et. al. (1997), Chapter 8.

Chapter 5: Derivative Pricing Models (Weeks 7-8)

Black-Scholes and Related Formulae

Implied Volatility

Option Prices when Volatility Is Stochastic

Option Prices for ARCH Processes

Implications of Long memory for Derivative Prices

Readings: Taylor (2005), Chapters 13-14; Campbell, et.al. (1997), Chapter 9; Singleton (2006), Chapter 15

Chapter 6: Volatility (Week 9)

Stylized Facts

ARCH Models: Specification, Estimation and Inference

Stochastic Volatility Models: Specification, Estimation and Inference

Continuous Time Volatility Models

Long Memory

Nonstationarity in Volatility

Readings: Taylor (2005), Chapters 8-11; Tsay (2002), Chapter 3

Chapter 7: Volatility: High Frequency Data and Methods (Week 10)

Realized Volatility: Theoretical Results

Realized Volatility: Empirical Results

Daily Range

Bipower Variation

Readings: Taylor (2005), Chapter 12; Tsay (2002), Chapter 5

Chapter 8: Volatility Forecasts Comparison (Week 11)

Two Measures of Forecast Accuracy

Historical Volatility Forecasts

Forecasts from Implied Volatilities

ARCH Forecasts that Incorporate Implied Volatilities

High-Frequency Forecasting Results

Readings: Taylor (2005), Chapter 15

Chapter 9: Extreme Values and Value at Risk (Week 12)

Quantiles

Copulas

Extreme value distributions

Readings: Lecture notes; Tsay (2002), Chapter 7

Chapter 10: Asset Allocation (Week 13)

Factor Models

Multivariate GARCH

Dynamic Conditional Correlation

Multivariate Stochastic Volatility Models

Readings: Lecture notes

Chapter 11: Density Estimation and Prediction (Weeks 14-15)

Risk-Neutral Density Concepts and Definitions

Parametric Risk-Neutral Densities

Nonparametric RND Methods

From Risk-Neutral to Real-World Densities

Readings: Taylor (2005), Chapters 16