

## Topics in Econometrics: Forecasting

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Office Hours: TBA

**Scheduled Class Time and Organization:** Class will meet three times a week *MWF from 11:00a - noon* for lecture in MCNB 285. Students are encouraged to ask questions and provide suggestions throughout the course.

**Course Description:** This course is designed as a sequel to Econ 6 (Introduction to Econometrics) and focuses on forecasting. Forecasting is important, as forecasts are constantly made in business, economics, government, finance, and many other fields and much depends on them. This course will introduce you to econometric time-series models and methods that can be used to generate forecasts. EViews will be used for computer-based calculations.

**Prerequisites:** Economics 1, 2, and 5, Mathematics 150 and 151 (or 140 and 141). Alternatively: Basic micro and macroeconomics, statistical methods, basic calculus and matrix algebra. I expect that you have taken Economics 6, although we will review aspects of regression analysis that are particularly important for the course.

**Course Web Page:** Course documents and information are available via blackboard: <http://courseweb.library.upenn.edu>.

**Course Texts:**

The required textbook is

- Diebold, Francis X. (2004): *“Elements of Forecasting,”* Third Edition, South Western College Publishing, ISBN 0-324-16382-7. (The book will be available in the Penn Bookstore).

Good general econometrics textbooks are

- Stock, James and Mark Watson (2003): *“Introduction to Econometrics,”* Addison Wesley, HB139.S765 2003, ISBN 0-201-71595-3.
- Wooldridge, Jeffrey M. (2003): *“Introductory Econometrics: A Modern Approach,”* Second Edition, South Western College Publishing, ISBN 0-324-11364-1.

You can access the EVIEWS software on the computers in the UDAL computer lab in the first floor of the McNeil Building. A student version of EVIEWS is available from Quantitative Micro Software, <http://www.eviews.com>. However, you are not required to purchase the software.

**Course Requirements:**

- **Problem Sets [20%]:** There will be approximately 6 problem sets, assigned during the semester. The problem sets are designed to give you the opportunity to review and enhance the material learned in class. **Note:** *Problem Sets will be posted on the course web page. You are responsible for checking your blackboard web-site and downloading the questions. I will make an announcement, whenever there is a new problem set posted.*
- **Midterm Exam [40%]:** *Date is Friday April 1*, closed books and notes.
- **Empirical Project [40%]:** Groups of at most 2, one project report about 15-20 pages, due on the last day of classes (*Friday, April 22, 2005*), assigned in February, graded on scale 0-100, -5 points/day penalty for late submission.

There will be no make-up examination for the mid-term. If a student is excused from the midterm exam, his or her problem sets / empirical project will be re-weighted.

## Forecasting – Course Outline

### 1 Introduction to Forecasting

- (i) Loss functions
- (ii) Information set and forecast horizon
- (iii) Point forecasts, interval forecasts, density forecasts
- (iv) Evaluating forecasts

### 2 Linear Regression Models

- (i) Review of the linear regression model
- (ii) Inference with Bayes Theorem
- (iii) Forecasting with a simple regression model

### 3 Modelling and Forecasting Trends

- (i) Modelling trends
- (ii) Estimating trend models
- (iii) Selecting the trend specification

### 4 Modelling and Forecasting Cyclical Fluctuations

- (i) Covariance stationary time series
- (ii) Moving average (MA) models
- (iii) Autoregressive (AR) models
- (iv) Autoregressive moving average (ARMA) models
- (v) Forecasting with ARMA models

## **5 Stochastic Trends**

- (i) Stochastic trends and forecasting
- (ii) Unit roots: estimation and testing

## **6 Forecasting Volatility**

- (i) Models of autoregressive conditional heteroskedasticity
- (ii) Forecasting volatility of asset returns

## **7 Multivariate Forecasting**

- (i) Vector autoregressive (VAR) models
- (ii) Estimation of VARs
- (iii) Forecasting with VARs - the need for shrinkage
- (iv) Policy analysis with VARs

## **8 Structural Dynamic Macroeconomic Models**

- (i) Dynamic stochastic general equilibrium (DSGE) models
- (ii) Forecasting with DSGE models
- (iii) Policy analysis and the Lucas Critique
- (iv) Combining VARs and DSGE models