

John F. Kennedy School of Government
Professor James Stock

API-202B
Empirical Analysis for Policy

Spring 1994

Class time: Monday, Wednesday 8:30 - 10:00 am, room L150

Review Session: Friday, 1:00 - 2:30 pm, room L150

Office: room L304. Phone: 496-0502

Office Hours: Wednesday, 2:15 - 4:00 pm

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Overview

The perspective of the course is that empirical analysis in general, and regression analysis in particular, provides a powerful tool for quantifying economic, political and sociological relationships. Often this can result in more effective policy analysis and design. In this light, the goal of this course is to equip public policy students with an understanding of the main tools of empirical analysis in policy applications. The first half focuses on core topics in multiple regression analysis which arise in a broad range of applications. The second half explores some more specialized topics, in particular the statistical analysis of models for discrete (or "categorical") data and issues associated with forecasting and the statistical and econometric analysis of time series data.

Course Outline

The course covers regression analysis and its application in a variety of contexts in economic and social policy analysis, as well as forecasting. The emphasis of the course is strongly empirical, and much of the learning will take place through analyzing data sets which have been or are being used in policy applications. As a general rule, the assignments are weekly. These assignments form an integral part of the course and typically will be discussed at length in class the day they are turned in. The substantive and technical matters addressed in the assignments are closely linked to the methodological topics addressed in the concurrent class sessions.

Prerequisites

Open to MPP's or qualified MPA's. The course assumes knowledge of statistics and probability at the level of API-201B/C. Class participation expected. CA's will be available for help with computer work, general Q&A, and review sessions.

TextbooksRequired Text

G *Basic Econometrics*, Damodar N. Gujarati (McGraw Hill). (Chapter numbers in the syllabus refer to the second edition.)

Optional Supplemental Textbooks

PR *Econometric Models and Economic Forecasts* by Robert S. Pindyck and Daniel L. Rubinfeld (McGraw-Hill).

WW *Econometrics* by Ronald J. and Wonnacott and Thomas H. Wonnacott (Wiley). (Chapter numbers in the syllabus refer to the second edition.)

K *A Guide to Econometrics* by Peter Kennedy (MIT Press).

L-B *Applied Regression: An Introduction* by Michael S. Lewis-Beck (Sage University Paper no. 22).

BF *Multiple Regression in Practice* by William D. Berry and Stanley Feldman (Sage University Paper no. 50).

PR is the most comprehensive of these texts and includes several topics which are beyond the scope of this course. WW and G provide somewhat less mathematical treatments of the core material of the course. K is more a handbook or "user's manual" than it is a textbook. The monographs by Berry and Feldman (BF) and by Lewis-Beck (L-B) provide good alternative treatments of the material in the first half of the course. The material in L-B does not go much beyond what was taught in API-201 and is therefore included mainly for review. B&F covers most of the topics to be discussed in classes 1 - 9. Neither L-B nor BF should be viewed as substitutes for the more comprehensive treatments given in G, PR, or WW.

There is no primary text for the forecasting part of the course; rather, material for this section will be made available through the CMDO.

Assignment, Exams and Grading

Course work consists of four parts: eight assignments, to be done on an approximately weekly basis and to be discussed in class; an empirical exercise; a midterm exam; and a final exam.

Homework assignments must be turned in by 8:30 a.m. the morning they are due in order for you to receive full credit. Students are encouraged to work in groups but each student must write his or her answers separately. The assignments will involve the use of the statistics package SST.

A 90-minute midterm exam will be given in class in March. A 3-hour final exam will be given in May. Both the midterm and final are open book/open notes.

The grade breakdown is:

Weekly assignments	37.5	30%	-37.5	12.5
Empirical exercise	25	20%	-25	10
Midterm exam	27.5	20%	-27.5	10
Final exam	37.5	30%	-37.5	10
			1	8
			3	2
			3	7.5

Class Schedule

* denotes optional readings

- ✓ 1. Wed. Feb. 2 Bivariate and multivariate regression I
 G, ch. 2, 3.1, 3.2 ✓
 *P&R ch. 1, 2.4.1 - 2.4.3, 3.1, 3.3, 3.4
 *L-B, ch. 1, 2
 - ✓ 2. Mon. Feb. 7 Bivariate and multivariate regression II
 G, ch. 3.3-3.6, 5.1-5.8, 7.1, 7.2, 14
 *P&R ch. 4.1, 4.2, 4.3; 5.2
 ✓ Assignment #1 due (Returns to education and the "gender gap")
 *L-B, ch. 3
 *B&F, ch. 1
 - ✓ 3. Wed. Feb. 9 Bivariate and multivariate regression III
 (Functional form and specification analysis)
 G, ch. 6.3, 6.4, 7.3, 7.5
 *P&R ch. 4.4, 4.5, 5.1
 *B&F, ch. 4, 5
 - ✓ 4. Mon. Feb. 14 Bivariate and multivariate regression IV
 (nonparametric regression; multicollinearity)
 G, ch. 10
 *B&F, ch. 3
 - ✓ 5. Wed. Feb. 16 Bivariate and multivariate regression V
 (Econometrics, social experiments, controlled experiments)
 Assignment #2 due (Elasticity of housing demand)
- Presidents Day, Mon. Feb. 21 -----
- ✓ 6. Wed. Feb. 23 Tests of joint hypotheses and confidence sets I
 G, ch. 8 (especially 8.10)
 *P&R ch. 2.4.4, 5.3
 - ✓ 7. Mon. Feb. 28 Tests of joint hypotheses and confidence sets II
 G, ch. 8 (continued)
 *P&R ch. 5.3 (continued)
 Assignment #3 due (Artsy sex discrimination suit) (not this one)
 - ✓ 8. Wed. March 2 Panel data and fixed effects; Error specification I
 (fixed effects; heteroskedasticity-robust standard errors)
 G, ch. 11
 *P&R ch. 6.1
 *B&F, ch. 6
 *P&R ch. 9.4 (Pooled cross-section and time-series data)

(where: one on
sex discrimination)

9. Mon. March 7 Error specification II

(weighted least squares)

*P&R ch. 6.2

*B&F, ch. 6 (continued)

*P&R appendix 6.1 (Generalized least squares in matrix form)

Assignment #4 due (Infrastructure investment)

10. Wed. March 9 Instrumental Variables Estimation I

(Simultaneous equations bias and errors-in-variables bias; two-stage least squares)

G, ch. 17, 19.4, 19.5

*P&R ch. 7.2 - 7.2

*P&R appendix 7.1 (Instrumental-variables estimation in matrix form)

11. Mon. March 14 Instrumental Variables Estimation II

Assignment #5 due (Returns to attending a junior college) ← need solution to PS#5

12. Wed. March 16 "Natural Experiments" and Instrumental Variables Estimation III

Joshua D. Angrist and Alan B. Krueger (1991), "Does Compulsory School Attendance Affect Schooling and Earnings?," *Quarterly Journal of Economics*, 106, 979-1014.

13. Mon. March 21 Midterm review ← get notes

14. Wed. March 23 Midterm exam

----- Spring Recess, March 26 - April 3 -----

15. Mon. April 4 Regressions with binary and limited dependent variables I

(Logit and probit)

G, ch. 15

*P&R ch. 10.1

16. Wed. April 6 Regressions with binary and limited dependent variables II

(Logit and probit, continued; simulations; tobit)

G, ch. 15 (continued)

Alicia Munnell et. al. (1992), "Mortgage Lending in Boston: Interpreting the MHDA Data," Federal Reserve Bank of Boston Working Paper no. 92-7.

*P&R ch. 10.2

17. Mon. April 11 Forecasting univariate time series I

(Forecasting univariate time series; autoregressive and autoregressive-moving average models; multiperiod forecasts)

*P&R ch. 15.1, 15.2, 16.1, 16.2

Assignment #6 due (Health insurance and job lock)

18. Wed. April 13 Forecasting univariate time series II

(Time trends, differences, and levels; model selection)

*P&R ch. 15.3

19. Mon. April 18 Forecasting multivariate time series I

(Vector autoregressions; stability analysis; recursive forecasts)

Assignment #7 due (Univariate forecasting)

20. Wed. April 20 Forecasting multivariate time series II ← get notes for class
(Simulations; structural vs. time series models)
Stephen K. McNees "The Role of Judgment in Macroeconomic Forecasting Accuracy," *International Journal of Forecasting* 6, 287-299.
*P&R ch. 12
21. Mon. April 25 Forecasting multivariate time series III
(Forecast evaluation; actual performance of macroeconomic forecasters)
Assignment #8 due (Multivariate forecasting)
22. Wed. April 27 No class: Empirical Exercise
23. Mon. May 2 No class: Empirical Exercise
24. Wed. May 4 Empirical Exercise: discussion