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Econ 220
Time Series Econometrics
Barbara Rossi

SYLLABUS

The objective of the course is to provide basic ‘spells’ to analyze data, estimate theoretical (simple) models, and hopefully teach you to love time series econometrics.

Classes are Tue-Thu 8:30-9:45 AM in Room 229, Soc. Sci. Building.

My office is Room 204, Social Science Building, phone 660 1801, email: brossi@econ.duke.edu. Please feel free to stop by at any time during office hours, Tue-Thu 9:45-10:45 AM.

Note that this course builds on Econ139-239, which is therefore required, and requires knowledge of linear algebra.

There will be problem sets approximately every two weeks. Exams will be discussed in class.

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Reading list and references

The books that we will use are available at the Duke University Store and are:

Stock and Watson, [Introduction to Econometrics](#), Addison Wesley (abbr. SW)

(you should already have this book if you took Econ 139-239 – you should be familiar with the material covered in Parts 1-3, which we will briefly review during the first week. We will mainly focus on Part Four in this course)

Hayashi, Fumio, [Econometrics](#), Princeton University Press (abbr. FH)

(This book will be useful for OLS and GMM estimation)

Hamilton, James, [Time Series Analysis](#), Princeton University Press (abbr. JH)

(this is a more advanced book that covers similar topics but at a much deeper level; it is more of a reference, although we will cover stuff from it)

Diebold, [Elements of Forecasting](#)

(this book is really optional)

The list of topics is as follows (in parenthesis, you can find the assigned chapters to read in the books – one star means “harder – you can skip what we did not cover in class”, three stars mean “really very hard and not required except for what explained in class”).

WEEK 1: *Review of OLS, hypotheses tests and conditional homoskedasticity.*

SW 4-5

FH 1*

- WEEK 2: *Review of asymptotic distribution theory: convergence in probability and in distribution, LLN, CLT, Slutsky and CMT.*
 SW 15
 FH 2*
- WEEK 3: *Introduction to Time Series data -- Covariance stationary processes: ARs, MAs and ARMA processes, and the correlogram, Forecasting and Lag length selection*
 SW 12.2, 12.3, 12.4
 JH 3.1-3.5, 4, 10***
- WEEK 4: *Non-stationarity: trends (deterministic and stochastic) and unit root tests: consequences, detection, remedies*
 SW 12.6
 JH 15***, 16***, 17***
- WEEK 5: *Non-stationarity: breaks, and tests for a structural break at a known and at an unknown break date (Chow and Andrews' QLR tests)*
 SW 12.7
 Hansen, B., "The New Econometrics of Structural Change", JEP 2001
- WEEK 6: *Estimation of Dynamic Causal effects w/ exogenous regressors, and dynamic multipliers, HAC robust estimation for serial correlation*
 SW 13.1, 13.2, 13.3, 13.4
 GLS estimation, Cochrane Orcutt and the Elliott-Rothemberg-Stock ADF-GLS efficient test for unit root
 SW 14.3
- WEEK 7: *GMM Estimation and IV: exactly identified and overidentified models, asymptotic properties and distribution, efficient GMM and tests for overidentifying restrictions*
 H 3*
- WEEK 8: *MLE: asymptotic properties, OLS as a special case, and relationship with GMM*
 FH 1.5, JH 5***
- WEEK 9: *VARs: estimation, identification by recursive ordering, Impulse Responses, variance decomposition and forecasting*
 SW 14.1, JH 11***
 Stock and Watson, VARs, Journal of Economic Perspectives 2001
- WEEK 10: *Cointegration*
 SW 14.4, JH 19***, 20***
- WEEK 11: *Conditional heteroskedasticity: ARCH models*
 SW 14.4 JH 21***
 Engle, GARCH 101, Journal of Economic Perspectives 2001
- WEEK 12: *Review and Catching up...*