YORK UNIVERSITY
GRADUATE STUDIES
DEPARTMENT OF ECONOMICS

ECONOMICS 6250
ADVANCED ECONOMETRIC THEORY II

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Course Description

This is a graduate course in time series analysis for students who have already taken courses in intermediate or advanced econometrics. The objective is to provide the students with a solid theoretical background and a selection of advanced econometric methods for later use in independent applied research. The course covers linear and nonlinear time series models with applications to macroeconomics and finance and their estimation methods. The content of the course includes: Part 1 - properties of univariate stationary processes and the Autoregressive Moving Average (ARMA) models. Part 2 - departures from stationarity, which include unit root processes and the Generalized Autoregressive Conditional Heteroskedastic (GARCH) models. Part 3 - multivariate models, such as the Vector Autoregressive (VAR) model and the Error Correction (ECM) model, causality and cointegration. The models and their applications will be illustrated by simulations and examples of time series from economics and finance. Additional examples for empirical analysis, simulations and problems will be provided to students in assignments. Suggested software are TSP, S+ and SAS.

Requirements, Evaluation and Other Details

1. Mid-term exam 30% approximate date of exam: February 15
2. Final exam 50% (date to be determined)
3. Assignments 20% three sets of empirical and theoretical questions distributed in class to be handed in on approximately February 8, March 1 and March 29.

Course Content

1. Introduction: time series (examples), objectives of time series analysis, model classification

2. Stochastic Processes: difference and lag operators, difference equations and their solutions, stationarity

3. Autocovariance and autocorrelation functions, Wold theorem

4. Conditional mean dynamics: ARMA models, model selection, estimation and testing, forecasting, seasonality

5. Nonstationary series: deterministic and stochastic trends, unit root tests, switching regimes, spurious regressions

6. Conditional variance dynamics: GARCH models, applications, Quasi Maximum Likelihood, estimation and testing

7. Multivariate Time Series Models: VAR - estimation and tests

8. Causality, exogeneity, impulse response function, variance decomposition

9. Cointegration and common trends

10. Error Correction Models (ECM) - estimation and tests

Books and Other Reference Materials

Required:

Enders, W., *Applied Econometric Time Series* 3rd or 4th ed., Wiley, 2010 or 2015

Suggested:

Books:

Martin, V., Hurn, S, Harris, D., *Econometric Modelling with Time Series*, Cambridge Unversity Press 2013

Wei, William W.S., *Time Series Analysis*, Pearson, 2006 (2nd ed.).

Brockwell, P.J. and R.A. Davis *Introduction to Time series and Forecasting*, 2nd ed., 2002, Springer

Brockwell, P.J. and R.A. Davis, *Time Series, Theory and Methods* , 2nd ed., Springer-Verlag, 1991.

Gourieroux, C. and A. Monfort, *Time Series and Dynamic Models*, Cambridge University Press, 1998.

Early Papers (easy to read) :

Bollerslev, T., R.F. Engle and D.B. Nelson (1993); "ARCH Models," in *Handbook of Econometrics*, Vol. 4.

Campbell, J.Y. and P. Perron, "Pitfalls and Opportunities: What Macroeconomists Should Know about Unit Roots," *NBER Macroeconomics Annual*, 1991, (O.T. Blanchard and S. Fisher, eds.), MIT Press.

Diebold,F.X. and M. Nerlove (1990); " Unit Roots in Economic Time Series," in *Advances in Econometrics* Vol 8, pp 3-69.

Nelson, C.R. and C.J. Plosser (1982), "Trends and Random Walks in Macroeconomic Time Series," *Journal of Monetary Economics* 10, pp. 139-162.

Sims, C.A. (1972), "Money, Income and Causality," *American Economic Review* 62, pp. 540-552.

Sims, C.A. (1980), "Macroeconomics and Reality," *Econometrica* 48, pp. 1-48.

Stock, J.H. and M.W. Watson (1988), "Testing for Common Trends," *JASA* 83, pp. 1097-1107.

Tiao, G.C. and G.E.P Box (1981), "Modelling Multiple Time Series with Applications," *JASA* 76, pp. 802-816.