A TRAVEL THROUGH THE UNIT ROOT LAND and THE COINTEGRATION VILLAGE
Ph.D. Economics UPF WINTER 2006-07

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Description
Unit Roots and Cointegration is a course of $10+\epsilon$ hours (with $\epsilon > 0$) designed to cover the theoretical basic foundations of this standard type of non-stationarity, with the goal of equipping students with the necessary tools for doing empirical time series research in Macroeconomics as well as in Finance.
The first block (part I) of the course presents the theory of univariate non-stationary (unit roots) time series variables. The second block (part II) focus on the multivariate level covering the different aspects of Cointegration-VAR modelling that have been relevant in the recent macroeconomic time series literature. The last block (part III) consists of some economic applications.

Software
Econometric and Time Series software: E-Views, GAUSS, MatLab, S-Plus, Stata, TSP, etc. I recommend the students to become familiar as soon as possible with at least two of the packages, for instance one for data analysis like E-Views, Stata or S-plus, and another for simulations like Gauss. The project can be done using any software. In class I will use E-Views and S-Plus.

COURSE OUTLINE

PART I: UNIVARIATE NON-STATIONARY LINEAR MODELS

VISITING THE UNIT ROOT LAND (3 hours)
Deterministic trends versus stochastic trends. Forecasting stationary processes versus non-stationary processes. Permanent versus transitory shocks. Decomposition in trend and cycle: Beveridge-Nelson decomposition. Testing for a Unit Root: Dickey-Fuller tests. Unit roots and structural changes.
Appendix: Some asymptotic results: Functional central limit theorem and continuous mapping theorem.

PART II: MULTIVARIATE NON-STATIONARY LINEAR MODELS

VISITING THE COINTEGRATION VILLAGE (3+3 hours)
Spurious regression. Cointegration. Implications of cointegration for the VAR modelling: The Error Correction model (Granger's representation theorem). Common trends representations: Stock-Watson and Gonzalo-Granger representations. Estimation and Inference: Single equation's approach (Engle-Granger) and system equation's approach (Johansen).
Appendix: Canonical Correlations and Reduced Rank Regressions.

PART III: CLASSICAL APPLICATIONS (1+ϵ hours)

- Growth Models and Time Series Tests
- Present Value Model and Cointegration
- The Purchasing Power Parity and Cointegration
- Price Discovery and Cointegration (**This will be the topic covered this year**)

Some Textbook References

Cuthberson, K., and D. Nitzsche, *Quantitative Financial Economics*. John Wiley and Sons, 2005.

Enders, W., *Applied Econometric Time Series*. John Wiley and Sons, second edition, 2004.

Hamilton, J., *Time Series Analysis*. Princeton University Press, 1994.

Hayashi, F., *Econometrics*. Princeton University Press, 2000.

Lutkepohl, L., *New Introduction to Multiple Time Series Analysis*. Springer 2005.

Patterson, K., *An Introduction to Applied Econometrics*. Palgrave, 2000.

Stock, J., and M. Watson, Introduction to Econometrics. Addison Wesley, 2003.

Lecture Notes from my web page (http://www.eco.uc3m.es/jgonzalo/teaching).

Some Readings for Part III

Campbell, J., and R. Shiller (1987), "Cointegration and Tests of Present Value Models," *Journal of Political Economy*, 95, 1062-1088.

Gonzalo, J., and C.W.J Granger (1995), "Estimation of Common Long Memory Components in Cointegrated Systems," *Journal of Business & Economic Statistics*, 13, 27-36.

Harris, F., McInish, T., and R. Wood (2002) "Security Price Adjustment Across Exchanges: An Investigation of Common Factor Components for the Dow Stocks," *Journal of Financial Markets*, 5, 277-308.

Jones, C., (1995), "Time Series Tests of Endogenous Growth Models," *The Quarterly Journal of Economics*, 110, 495-525.

Taylor, A.M., and M.P. Taylor (2004), "The Pruchasing Power Parity Debate," *http://www.nber.org/papers/w10607*.

I hope you enjoy this mini Trip. GOOD LUCK