RED. Rome Economics Doctorate

Macroeconometrics

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I assume that the students know the basic ideas and results about scalar ARMA processes. However, usually this knowledge does not reach the "basic principles" of the theory of stationary stochastic processes, their prediction, the Wold theorem. Nor are they familiar with vector ARMA processes and cointegration, with the consequence that they often find difficult to grasp Structural VAR models and their identification. I want to present high-level theory in a simple way, with many examples, exercises and some rigorous proofs.
The exam will consist of a small set of exercises and take place in the classroom.

1. **Time series.** Stationary stochastic processes. Autocovariance function. White noise processes. Moving averages. Infinite moving averages. Autoregressive processes.

2. **Prediction.** Best predictor, best linear predictor. Wold Decomposition Theorem. ARMA processes. Estimation and testing of ARMA processes.

3. **Vector time series.** Extension of the standard definitions to the n-dimensional case: stationarity, autocovariance function, etc. Wold Decomposition Theorem. VARMA processes. State space representation for VARMA processes. Estimation and testing of VARMA processes. Cointegration.

4. **Structural VAR models.** VARs as approximations toVARMA processes. Identification of the structural shocks. Recursive identification. Blanchard and Quah's long-run identification restriction. Fundamentalness.

References

Hamilton, J. D. (1994). *Time Series Analysis*, Princeton: Princeton University Press.
Lütkepohl, H. (2005). *New Introduction to Multiple Time Series Analysis*, Berlin: Springer.
Brockwell, P. J. and R. D. Davis (1996). *Introduction to Time Series and Forecasting*, Berlin: Springer.
Brockwell, P. J. and R. D. Davis (1991). *Time Series: Theory and methods*, Berlin: Springer.
Enders, W. (2010). *Applied Econometric Time Series*, New York: Wiley.
Further references will be given in class.