

**Katarina Juselius (University of Copenhagen, Denmark)**

*The Cointegrated VAR Model: Econometric Methodology  
and Macroeconomic Applications*

The purpose of this course is to give a theoretical and an empirical understanding of the econometric analysis of long-run and short-run structures of macroeconomic models based on a system of equations approach. In particular, the course will focus on likelihood based inference in the cointegrated VAR model and the implications of nonstationarity for empirical macroeconomics.

The course will give an intuitive as well as formal understanding of the applicability of empirical VAR modelling and illustrate the econometric concepts with applications to macroeconomic problems such as: (1) inflation and monetary policy, (2) purchasing power parity and uncovered interest rate parity, (3) wage determination and unemployment.

**A more detailed description**

As a starting point I will discuss a general framework in which an economic problem can be addressed as an inherently stochastic problem using a multivariate decomposition of the data into trends, cycles and irregular components. As an illustration of the methodological approach I will discuss “Inflation and Monetary Romer (1996) “Advanced Macroeconomics” and demonstrate that the basic economic (core and auxiliary) hypotheses can be logically formulated as testable restrictions within a stochastic multivariate system. I will then discuss the extent to which a p-dimensional cointegrated VAR model can be used to address and test low and high level hypotheses suggested by macroeconomic theory in such a framework.

In the econometric theory part I will first discuss the basic assumptions of the cointegrated VAR model and its basic properties given by the moving average representation . I will derive the reduced rank ML estimator and discuss the determination of cointegration rank when there are deterministic components in the model. The statistical concepts of cointegration relations and common driving trends will be related to the notion of permanent and transitory shocks, anticipated and unanticipated shocks in the economy. Hypotheses related to long-run properties in the data will be formulated as hypotheses on cointegrated relations, weak exogeneity, and driving trends and the corresponding maximum likelihood estimation and testing procedures will be derived. In the VAR representation three aspects of the identification problem, formal, empirical, and economic identification, will be thoroughly discussed in relation to the long-run structure of steady-state relations and to the short-run structure of adjustment equations. In the moving average representation identification of shocks based on the structural VAR approach will be discussed and illustrated with applications to macroeconomic problems.

**Requirements for the course:**

The lectures are based on selected chapters from a book I am presently working on 'The Cointegrated VAR Model: Econometric Methodology and Empirical Applications'.

The statistical model analysis is based on the full information maximum likelihood method and can be seen as an economically oriented companion book to Part I of Soren Johansen (1996) .

**Computer software:**

There will be demonstrations of the software packages PcGive, PcFiml and Cats in Rats which have been used in the empirical applications of the course.

**References**

Doornik, J.A. and Hendry, D.F. (2001) GiveWin and PcFiml. An interface to empirical modelling, Timberlake Consultants.

Henrik Hansen and Katarina Juselius (1994): CATS for RATS4. Manual to Cointegration Analysis to Time Series.

Johansen, S (1996): 'Likelihood-Based Inference in Cointegrated Vector Autoregressive Models', Oxford University Press.

Juselius, K. (2002): ' The Cointegrated VAR Model: Econometric Methodology and Empirical Applications', Lecture Notes, University of Copenhagen.