A graduate course in the Cointegrated VAR Model: Special Topics

by

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Background:

The Cointegrated VAR (CVAR) model combines stationary differences and stationary cointegrated relations between nonstationary variables and allows us to analyze economic data as short-run variations around moving long-run equilibria. Long-run forces are themselves divided into the forces that move the equilibria (pushing forces, which give rise to stochastic trends) and forces that correct deviations from equilibrium (pulling forces, which give rise to cointegrating relations). Structuring the data in this way offers a way of nesting a multivariate, path-dependent data-generating process and relevant dynamic macroeconomic theories. Unlike approaches in which the data are silenced by prior restrictions, this way of structuring the data offers a rich context in which the data can speak freely on empirically relevant mechanisms.
Why is this relevant? The recent financial and economic crisis has pointed to a need to improve our understanding of empirical regularities in historical data without forcing them into pre-specified structures. If the latter have become obsolete this is likely to prevent us from seeing what we most urgently need to see. An adequately specified Cointegrated VAR model is likely to improve our understanding of the mechanisms at work and has a potential of identifying such signals in the data suggesting that the economy is out of equilibrium before the outbreak of the crisis.

General information:

Curriculum: Juselius, K. (2006), The Cointegrated VAR model: Methodology and Applications. Oxford University Press , Oxford. The theoretical parts draw on S. Johansen (1996) 'Likelihood-Based Inference on Cointegration in the Vector Autoregressive Model', Oxford University Press.
We expect the participants to have some basic econometric experience and a theoretical knowledge of time-series analysis corresponding to, for example, Johnston and Dinardo (1997) 'Econometric Methods'. MacGraw-Hill. Also we expect a basic knowledge of the CVAR model approximately corresponding to Chapters 1-5 and 7-8 in Juselius (2006).
The course consisting of 12 hours of lectures is a mixture of theory (Prof. Johansen) and applications (Prof. Juselius).

The course outline:

1. **The role of deterministic terms in the VAR model. Chapter 6.** An adequate specification of deterministic components (trend, constant, dummies) allows us to control for institutional changes in the sample period and is often crucial for a good

empirical model description. How to do it when data are nonstationary is, however, often not well understood in empirical applications. (2 hrs)

2. **Tests on the long-run structure. Chapter 10.** We discuss first how to formulate and test hypotheses on long-run relations as restrictions on the cointegration structure. Hypotheses related to long-run properties in the data are formulated as hypotheses on cointegrated relations and driving trends and the corresponding maximum likelihood estimation and test procedures are derived. The close connection between the statistical concept of cointegration relations and the economic concept of steady-state relations is discussed and illustrated with empirical applications. (2 hrs)
3. **Tests on the short-run adjustment structures. Chapter 11.** Hypotheses on the pushing forces of the system (weak exogeneity) and the pulling forces (pure endogeneity) are formulated and tested as restrictions on the short-run adjustment coefficient matrix. (2 hrs)
4. **Identification of the long-run structure. Chapter 12.** We formulate the general problem of identification when data are non-stationary and define the notion of formal, empirical, and economic identification. We give a detailed treatment of how to impose and test (over)identifying restrictions on the long-run structure of the model. (2 hrs)
5. **Identification of common stochastic trends. Chapter 14.** We formulate the identification problem of shocks and stochastic trends in the moving average model as a reduced rank restriction on the long-run impact matrix defining the common driving trends. We use the statistical model to formalize the economic concept of anticipated and unanticipated shocks and discuss the implications on the model when the latter are either permanent or transitory. We give a detailed treatment of how to impose and test (over)identifying restrictions on long-run common trends. (2 hrs)
6. **Introduction to I(2). Chapter 16.** We also discuss how to diagnose I(2) symptoms in the I(1) model, give a formal definition of the I(2) model as restrictions on the parameters of the general VAR model, and discuss the role of deterministic components. The I(2) model will be given an economic interpretation in terms of the recent theory of imperfect knowledge economics (Frydman and Goldberg, 2007). The maximum likelihood estimation procedure is discussed and the components of the I(2) model are given an economic interpretation in terms long- and medium-run stochastic trends versus static and dynamic steady-state relations. Based on long-run price homogeneity we discuss the nominal to real transformation and the conditions under which it is valid. (2 hrs).