Econometrics II
Time Series #2

Thursday, 10.04.2015

1. (VAR analysis - SVAR model) Consider the following dynamic simultaneous equation model

$$\begin{aligned} y_{1t} &= \beta_{21} y_{2t} + \gamma_{11} y_{1t-1} + \gamma_{12} y_{2t-1} + \varepsilon_{1t} \\ y_{2t} &= \beta_{12} y_{1t} + \gamma_{21} y_{1t-1} + \gamma_{22} y_{2t-1} + \varepsilon_{2t} \end{aligned}$$

   (a) Rewrite this model as a structural VAR (SVAR) model, i.e., in matrix form of

$$By_t = \Gamma y_{t-1} + \varepsilon_t,$$

   where $y_t = (y_{1t}, y_{2t})^\top$, $\varepsilon_t = (\varepsilon_{1t}, \varepsilon_{2t})^\top$ and B, Γ are matrices of parameters. It is assumed that the error term satisfies $\varepsilon_t \overset{iid}{\sim} (0, \Sigma)$ and the variance-covariance matrix Σ is diagonal with σ_i^2 for $i = 1, 2$.

   (b) Determine the reduced form of the above SVAR model

$$y_t = Ay_{t-1} + u_t,$$

   and use it to explain that the parameters of the VAR(1) model are not identified without further restrictions.

   (c) What kind of restrictions are usually put on the parameters of the SVAR(1) in order to achieve identification?

   (d) Suppose B^{-1} is a lower triangular matrix. What does this imply for the structural model? How can this be used to identify the VAR model?

2. (VAR application exercise) Fit a VAR model using phillips.dta.

   (a) Choose the optimal number of lags, estimate the VAR and perform various statistical tests.

   (b) Calculate IRs using a Choleski decomposition scheme and comment them.