Package Name: TVSVAR
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Date: 2015.02.24

Default Proc Name: TVSVAR
Default Menu Text: Time Varying SVAR
Interface: Dialog and command line

Description

This add-in allows you to perform the estimation of Time Varying Structural Vector Auto Regression (TVSVAR) models by using a Gibbs sampling approach (see more details in Primiceri 2005).

To illustrate the main idea of this add-in, consider the following VAR model:

$$y_t = \mathrm{c}_t + B_{1,t}y_{t-1} + \cdots + B_{k,t-k} + u_t$$

where y_t is an $n \times 1$ vector of observed endogenous variables; c_t is an $n \times 1$ vector of time varying coefficients that multiply constant terms; $B_{i,t}, i = 1, \ldots, k$ are $n \times n$ matrices of time varying coefficients; u_t are heteroscedastic unobservable shocks with variance covariance matrix Ω_t, defined by

$$A_t \Omega_t A_t' = \Sigma_t \Sigma_t'$$

where A_t is lower triangular matrix

$$A_t = \begin{bmatrix} 1 & 0 & \ldots & 0 \\ \alpha_{21,t} & 1 & \ddots & \vdots \\ \vdots & \ddots & \ddots & 0 \\ \alpha_{n1,t} & \ldots & \alpha_{nn-1,t} & 1 \end{bmatrix}$$

and Σ_t is the diagonal matrix

$$\Sigma_t = \begin{bmatrix} \sigma_{1,t} & 0 & \ldots & 0 \\ 0 & \sigma_{2,t} & \ddots & \vdots \\ \vdots & \ddots & \ddots & 0 \\ 0 & \ldots & 0 & \sigma_{n,t} \end{bmatrix}.$$

It follows that

$$y_t = \mathrm{c}_t + B_{1,t}y_{t-1} + \cdots + B_{k,t-k} + A_t^{-1}\Sigma_t \varepsilon_t,$$

$$V(\varepsilon_t) = I_n.$$

Stacking in a vector B_t all the $B_{i,t}, i = 1, \ldots, k$ coefficients the above equation can be rewritten as

$$y_t = \mathrm{X}_t' B_t + A_t^{-1}\Sigma_t \varepsilon_t,$$

$$X_t' = I_n \otimes [1, y_{t-1}', \ldots, y_{t-k}'].$$

The dynamics of the model's time varying parameters is specified as follows:

$$B_t = B_{t-1} + v_t,$$

$$\alpha_t = \alpha_{t-1} + \zeta_t,$$

$$log\sigma_t = log\sigma_{t-1} + \eta_t.$$

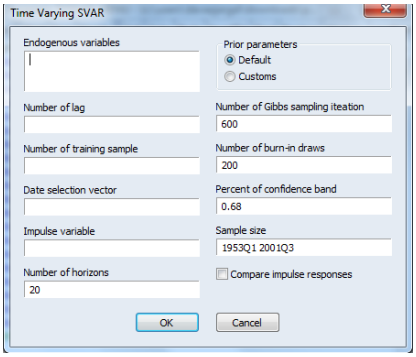
All innovations in the model are assumed to be jointly normally distributed with the following assumptions on the variance covariance matrix:

$$V = Var\begin{bmatrix}\varepsilon_t \\ v_t \\ \zeta_t \\ \eta_t\end{bmatrix} = \begin{bmatrix}I_n & 0 & 0 & 0 \\ 0 & Q & 0 & 0 \\ 0 & 0 & S & 0 \\ 0 & 0 & 0 & W\end{bmatrix},$$

where I_n is an n dimensional identity matrix, Q, S and W are positive definite matrices.

Dialog

Upon running the add-in from the menus, a dialog will appear:



The first box lets you specify endogenous variables for Time Varying SVAR while the second box specify a number of lags. On the next box enter a number of training sample. On the fourth box enter date selection vector for impulse response analysis. For example, if you want the impulse responses for date of 1975q1, 1981q3, 1996q3 just put 1975q1 1981q3 1996q3 on the box (for command line case, you should create a svector for date selection. For example, svector datevec =@wsplit("1975q1 1981q3 1996q1") . The fifth box let you specify impulse variable. Other boxes specifies some optional inputs.

References:

Primiceri, G.E. (2005): 'Time Varying Structural Vector Autoregressions and Monetary Policy', Review of Economic Studies 72, 821-852

Command line:

Syntax: tvsvar(options) lags training_sample date_selection impulse_variable @ endogenous variables

E.g. tvsvar(comp=1) 2 40 datevec interest @ inflation unemployment interest

Options:

argument	***explanations***
horizon	number of steps for impulse response function
prior	1 for default prior, 0 for custom prior
mb	number of Gibbs sampling replication
nb	number of burn-in draws
sample	sample size
ci	percent of error band
comp	1 for comparing irf, 0 for no compare (default)
kb	constant scaling the prior of Q
ka	constant scaling the prior of S
kh	constant scaling the prior of W