ECONOMETRIC METHODS II: TIME SERIES 2010

HOME WORK 1

Instructions

Write up your results and submit electronically (preferably in pdf format) to knimark@crei.cat **and** benedikt.herz@gmail.com before 24.00 Tuesday May 25 together with any MatLab code used in the exercise. You may work in groups of up to three people. Please list all names in group on front page. To answer the questions, you will need to download the data file `HW1data.mat` from the course web page at http://www.kris-nimark.net/TS_UPF_2010.html. The file `HW1data.mat` is a MatLab is of the form

$$\texttt{HW1data.mat} = \begin{bmatrix} \Delta GDP_0 & \Delta GDP_1 & \cdots & \Delta GDP_T \\ \pi_0 & \pi_1 & \cdots & \pi_T \\ i_0 & i_1 & \cdots & i_T \end{bmatrix}$$

where ΔGDP_t, π_t and i_t is US GDP growth, CPI inflation and Federal Funds Rate respectively. The data is of quarterly frequency and the sample is from 1955:Q2-2010:Q1.

Question 1: SVARs and long run restrictions

Define the vector $\mathbf{y}_t$ as

$$\mathbf{y}_t \equiv \begin{bmatrix} \Delta GDP_t \\ \pi_t \end{bmatrix} \tag{0.1}$$

a) Estimate the SVAR

$$A_0 \mathbf{y}_t = A_1 \mathbf{y}_{t-1} + \varepsilon_t \tag{0.2}$$

$$\varepsilon_t \equiv \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \end{bmatrix} \sim N(0, I) \tag{0.3}$$

by imposing that inflation shocks ε_{2t} do not have a permanent effect in GDP levels. (Remember: $\Delta GDP_t \equiv GDP_t - GDP_{t-1}$)

b) Compute the impulse response functions and plot the results. Interpret the graphs relation to the identifying assumption. What happens to inflation after a permanent productivity shock?

c) Compute and plot the impulse response of inflation and GDP levels to a permanent productivity shock. Interpret the graphs relation to the identifying assumption.

d) What is the fraction of the variance of inflation attributable to permanent productivity shocks?

Date: May 18, 2010.

Question 2: SVARs and contemporaneous restrictions

Define the vector $\mathbf{y}_t$ as

$$\mathbf{y}_t \equiv \begin{bmatrix} \Delta GDP_t \\ \pi_t \\ i_t \end{bmatrix} \tag{0.4}$$

a) Estimate the SVAR

$$A_0\mathbf{y}_t = A_1\mathbf{y}_{t-1} + A_2\mathbf{y}_{t-2} + A_3\mathbf{y}_{t-3} + A_4\mathbf{y}_{t-4} + \varepsilon_t \tag{0.5}$$

$$\varepsilon_t \equiv \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \end{bmatrix} \sim N(0, I) \tag{0.6}$$

by imposing that interest rates do not respond to inflation or output contemporaneously, and that inflation do not respond contemporaneously to GDP growth. Rewrite the SVAR(4) as an equivalent SVAR(1) process.

b) Compute the impulse response functions and plot the results for each shock and endogenous variable.

c) Re-estimate the SVAR assuming that neither GDP growth nor inflation responds to interest rates contemporaneously, but that interest rates can respond to all other variables contemporaneously. Compute and plot the impulse response function to an interest rate shock.

d) Does the SVAR of a) or c) above fit the data better? Why?

e) For both the identifying restrictions of a) and c), compute historical shock decompositions of the endogenous variables. Plot the time series of the component of $\mathbf{y}_t$ attributable to initial conditions and the monetary policy shocks along with the actual realized $\mathbf{y}_t$.