VAR estimation exercise*

The course web site contains a link to a data set, in a file called `rmpy.txt`, for the Federal Funds rate, M1, CPI, and Industrial Production for July 1954 through October 1997 (1954:7-1997:10). The variables are arranged in four columns, in the order listed, and each row is a separate month. All variables are measured in natural logs, except the Fed Funds rate which is measured as a percentage at an annual rate. The web site also has links to Matlab routines for VAR analysis.

`rfvar23.m`: computes the sufficient statistics for a Gaussian reduced form likelihood, conditional on initial observations. The program is written so that you can give it dummy observations as well as real data, and it will also automatically generate dummies that favor persistence, either of the single "all variables will persist if they have all been stable" type or of the separate "each variable will persist if it has been stable" type.

`fcast.m`: uses estimated VAR coefficients, plus initial conditions, to compute forecasts over any time horizon.

`impulsdtrf.m`: constructs impulse resopnses from VAR coefficients as estimated by rfvar3.

In carrying out the exercise below, you can use these programs. You could also use the RATS program, which has commands that act like these matlab functions, or Gauss, for which you might be able find analogous routines, or for which you could translate the code of the matlab routines.

(1) Estimate a reduced-form VAR for these variables from these data by maximum likelihood, assuming normally distributed disturbances, 7 lags, and including a constant term. Form forecasts of the entire sample, conditional on the 7 periods of initial data, using the estimated parameters, and plot them and the actual data against time. Besides the variables directly in the system, show the actual and forecast data for the log of real balances. Do the estimates show implausibly accurate or intricate long term forecasts of the sample? Find the roots of the system. Are they all stable?

(2) Have the program add a single dummy observation that has current and all lagged values of each series set to the mean of the first 7 observations, and the constant vector set to 1 as in an ordinary observation. Weight this observation with a factor of 7. (You do this by just making `lambda` 7 in the program call.) Redo the analysis of the preceding part. Is there much difference in the behavior of the long term forecasts?

(3) Add 4 further dummy observations that set all data values, including the constant vector, to zero, except that current and all lagged values of one variable are set to the mean of that variable's initial values. (These are "sum-of-coefficient" dummy

observations.) Weight these observations by 3 (`mu=3`). Redo the analysis again. What is the effect on the long term forecasts?

(4) Generate impulse responses for one of your estimated systems, using two Choleski orderings— r, m, p, y and p, y, r, m. Here he first variable's shock should have an immediate effect on all the others and the last variable's shock should have no effect immediate effect on the others.