

Wiley Series in Probability and Statistics

MULTIVARIATE TIME SERIES ANALYSIS

With R and Financial Applications

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- Construct the z_t series. Obtain the time plots of z_t .
 - Select a VAR order for z_t using the BIC criterion.
 - Fit the specified VAR model and simplify the fit by the command `refVAR` with threshold 1.65. Write down the fitted model.
 - Is the fitted model adequate? Why?
 - Compute the impulse response functions of the fitted model using orthogonal innovations. Show the plots and draw conclusion based on the plots.
 - Consider the residual covariance matrix. Obtain its Cholesky decomposition and the transformed innovations. Plot the orthogonal innovations.
- 2.4 Consider the U.S. quarterly gross private saving (GPSAVE) and gross private domestic investment (GPDI) from first quarter of 1947 to the third quarter of 2012. The data are from the Federal Reserve Bank of St. Louis and are in billions of dollars. See the file `m-gpsavedi.txt`.
- Construct the growth series by taking the first difference of the log data. Denote the growth series by z_t . Plot the growth series.
 - Build a VAR model for z_t , including simplification and model checking. Write down the fitted model.
 - Perform a chi-square test to confirm that one can remove the insignificant parameters in the previous question. You may use 5% significant level.
 - Obtain the impulse response functions of the fitted model. What is the relationship between the private investment and saving?
 - Obtain one-step to eight-step ahead predictions of z_t at the forecast origin 2012.III (last data point).
 - Obtain the forecast error variance decomposition.
- 2.5 Consider, again, the quarterly growth series z_t of Problem 4. Obtain Bayesian estimation of a VAR(4) model. Write down the fitted model.
- 2.6 Consider four components of U.S. monthly industrial production index from January 1947 to December 2012 for 792 data points. The four components are durable consumer goods (IPDCONGD), nondurable consumer goods (IPNCONGD), business equivalent (IPBUSEQ), and materials (IPMAT). The original data are from the Federal Reserve Bank of St. Louis and are seasonally adjusted. See the file `m-ip4comp.txt`.
- Construct the growth rate series z_t of the four industrial production index, that is, take the first difference of the log data. Obtain time plots of z_t . Comment on the time plot.
 - Build a VAR model for z_t , including simplification and model checking. Write down the fitted model.
 - Compute one-step to six-step ahead predictions of z_t at the forecast origin $h = 791$ (December 2012). Obtain 95% interval forecasts for each component series.