Introduction to VAR Modeling in IRIS

read_me_first.m

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Summary

The tutorial is an introduction into VAR modeling in IRIS. We prepare data, estimate a reduced-form VAR, check its properties, and assess the sampling uncertainty by bootstrapping. We then produce conditional and unconditional forecasts, and show how to identify a structural VAR (SVAR).

Contents

1 How to Best Run This Tutorial?

Each m-file in this tutorial is split into what is called "code sections" in Matlab. A code cell is a shorter block of code performing a specific task, separated from other code cells by a double percent sign, %% (usually with a title and brief introduction added). By default, the cells are visually separated from each other by a horizontal rule in the Matlab editor.

Instead of running each m-file from the command window, or executing this `read_me_first` as a whole, do the following. Open one tutorial m-file in the Matlab editor. Arrange the editor window and the command window next to each other so that you can see both of them at the same time. Then run the m-file cell by cell. This will help you watch closely what exactly is going on.

To execute one particular cell, place the cursor in that cell (the respective block of code will get highlighted), and select "Run Current Section" from a contextual menu (upon a right click on the mouse), or pressing a keyboard shortcut (which differ on different systems and Matlab versions). To learn more on code sections, search Matlab documentation for "code section".

2 Read and Prepare Data for VAR Estimation

In this file, we read two CSV data files with some basic U.S. time series (some monthly, some quarterly), filter the data using an HP filter with tunes, and prepare a database that will be later used to estimate a VAR model.

```
40 % edit read_data.m;
41 read_data;
```

3 Estimate Simple Reduced-Form VAR

In this file, we estimate an unconstrained reduced-form VAR using the data prepared in `read_data`. We look inside the VAR object at the estimated coefficient matrices and eigenvalues. We then resimulate the historical data using the estimated residuals.

```
50 % edit estimate_simple_VAR.m;
51 estimate_simple_VAR;
```

4 Resimulate Data

In this file, we take the estimated VAR, and resimulate the historical data to see that we indeed reproduce the observed paths. We then calculate the contributions of residuals to the historical paths of the VAR variables, and run a counterfactual exercise with one type of residuals removed from the history.

```
61 % edit resimulate_data.m;
62 resimulate_data;
```

5 Estimate VAR with Parameter Constraints

VARs can be estimated with various types of linear parameter constraints. In this file, we show two basic ways how to impose such constraints, and compare the results with the unrestricted VAR estimated previously in `estimate_simple_VAR`.

```
% edit estimate_VAR_with_constraints.m;
estimate_VAR_with_constraints;
```

6 Bootstrap VAR

Bootstrap is a simple yet powerful method to assess sampling uncertainty in the estimated characteristics of, or simulation results based on, parametric models, such as VARs or SVARs. In this file, we show how to resample from an estimated VAR object, plot bootstrapped histograms for the estimated coefficients and the VAR autocorrelation function, and generate confidence intervals for parameter uncertainty in out-of-sample simulations.

```
% edit bootstrap_VAR.m;
bootstrap_VAR;
```

7 Produce Unconditional and Conditional Forecasts

In this file, we use the estimated VAR to produce unconditional and conditional forecasts. One forecast is conditioned upon a path for one endogenous variable. Another forecast is conditioned upon a path for a so-called instrument. Forecast conditioning instruments can be defined as linear combinations of endogenous variables and their lags, and added to VAR objects.

```
% edit produce_forecasts.m;
produce_forecasts;
```

8 Identify structural VAR

Use a simple identification scheme based on Choleski decomposition to calculate a structural VAR from the estimated reduced-form VAR. Check the properites of the structural shocks, and run shock (impulse) response simulation.

```
% edit identify_structural_VAR.m;
identify_structural_VAR;
```

9 Publish M-Files to PDFs

The following commands can be used to create PDF versions of the model file and the m-files:

```
latex.publish('read_me_first.m',[],'evalCode=',false);
latex.publish('read_data.m');
latex.publish('estimate_simple_VAR.m');
latex.publish('resimulate_data.m');
latex.publish('estimate_VAR_with_constraints.m');
latex.publish('bootstrap_VAR.m');
latex.publish('produce_forecasts.m');
latex.publish('identify_structural_VAR.m');
```