The RATSletter

RATS Version 7.3

Version 7.3 of RATS is nearing completion. Watch our website in the next month or so for more information, a release date, and ordering details. Meanwhile, here is a look at what's coming in 7.3.

Preview Mode for Data Wizard

When using the *Data Wizard* to read data from spreadsheets, text files, and other data files, you can now use a "Show Preview" button to view the contents of the file on-screen.

This will make it easier to verify that you are working with the correct file, deal with any header or footer lines, ensure the date parameters are set properly, and so on.

More File Formats, including Excel 2007

RATS 7.3 will support reading data from Excel® 2007 "xlsx" format spreadsheets, as well as Stata® data files and EViews® workbook files.

New Wizard for Recursive Least Squares

We've added a new Wizard interface for the **RLS** (Recursive Least Squares) estimation instruction.

DISPLAY Instruction

DISPLAY now has an option for delimiting output with tabs, commas, or semicolons, in addition to the default behavior of separating terms with blank spaces. The option is:

```
delimited=[none]/tab/comma/semicolon
```

This works when outputting to the screen, but is primarily useful when using the UNIT option to output to a text file.

Also, you can now use **DISPLAY** to show the contents of a parameter set or an equation.

DLM Instruction

DLM gets an option called MU for handling a shift in the observable: $y_t = mu_t + \mathbf{C}'\mathbf{X}_t + v_t$

NPREG and DENSITY

Both now have SMOOTHING options which scale the default kernel width up or down.

In This Issue

The Bank of Canada's DSGE Models

By Stephen Murchison, Bank of Canada

The Bank uses the **DSGE** command in conjunction with ToTEM[1], its main projection and policy analysis model for the Canadian economy, for several reasons.

Certainly there are other software programs that feature algorithms for (a) linearizing DSGE models and (b) solving systems of linear, forward-looking difference equations. To our knowledge, however, none combines these features with the vast array of dedicated time series commands found in RATS. In addition, many of these commands can be used directly with the reduced-form model generated by **DSGE**. A particularly useful combination for ML estimation is the **DSGE** and **DLM** commands, in conjunction with the **FIND(method=simplex)** optimization command.[2]

Second, with the recent addition of the ETZ option to **DSGE** (March 2009 *RATSletter*), it is possible to more effectively control agents' information set in ToTEM. For instance, ETZ can be used to impose judgement on a forecast in some future period (through one or more "shocks"), and allow agents to respond immediately to the judgement, via model-consistent expectations.

DSGE(ETZ) was recently used to generate the "fan charts" for inflation featured in the Bank's April Monetary Policy Report. The asymmetry of the bands reflects the influence of a binding lower bound on the policy interest rate. Shocks to the monetary-policy rule were used to enforce the lower bound in ToTEM, and ETZ was employed to render future shocks part of agents' *time-t* information set.

Finally, we have combined **DBOX** with **DSGE** and **DLM** to develop a comprehensive, menu-driven program that permits the user to change ToTEM's calibration, generate impulse response functions and variance decompositions, and produce model-based forecasts. This tool will soon be made available to all interested Bank staff.

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[1] ToTEM (Terms of Trade Economic Model) is a multi-sector, open-economy dynamic stochastic general equilibrium model of the Canadian economy. Documentation is available at:

http://bankofcanada.ca/en/res/tr/2006/tr97-e.html.

[2] Our experience is that the Simplex algorithm is more robust than derivative-based algorithms, which often get stuck

New Examples and Procedures

We recently posted more than two dozen new or revised procedures and examples on our website. The files will be included with RATS 7.3, but you can download them now from the web using our Procedure Browser:

www.estima.com/cgi-bin/procbrowser.cgi

You'll find the link to the Procedure Browser in the "Resources" section of the site (www.estima.com).

BernankeMihovQJE1998.zip

Replication files for Bernanke & Mihov (1998), "Measuring Monetary Policy", *QJE*, vol. 113, no. 3, pp. 869-902 (monthly data calculations). Includes maximum likelihood estimation of structural VAR's, Markov switching estimate of an SVAR and Monte Carlo integration of a just identified SVAR.

Betaparms.src

Returns a 2-vector with the two parameters for a Beta distribution with the given mean and standard deviation

BlanchardQuahAER1989.zip

Replication for Blanchard and Quah (1989), "The Dynamic Effects of Aggregate Demand and Supply Disturbances", *AER*, vol. 79, no. 4, pp. 655-673. Demonstrates several topics in VAR's: historical decomposition, recovery of structural shocks, long-run restrictions.

BQDoDraws.src

Alternate to MCVARDoDraws which does Monte Carlo draws for a 2-variable BQ factorization, from Blanchard and Quah (1989).

CFfilter.src

Minor fixes for this procedure, which implements a generalized version of the Baxter-King bandpass filter developed by Christiano and Fitzgerald.

Exactinverse.src

Computes the exact (limit) inverse of $\mathbf{A} + k\mathbf{B}$ as k goes to infinity, for p.s.d. symmetric matrices $\mathbf{A}$ and $\mathbf{B}$. This is a matrix of the form $\mathbf{C} + k^{-1}\mathbf{D}$.

This was introduced by Koopman (1997), "Exact Initial Kalman Filtering and Smoothing for Nonstationary Time Series Models," *JASA*, vol. 92, pp. 1630-1638. However, the calculation method has been simplified.

GaliQJE1992.zip

Replication file for Jordi Gali (1992), "How Well Does the IS–LM Model Fit Postwar U.S. Data", *QJE*, vol. 107, no. 2, pp. 709-738. Demonstrates VAR's with short and long run restrictions, the instruction **CVMODEL**, and the ShortandLong procedure.

GammaParms.src

Returns a 2-vector with the two parameters for a Gamma distribution with the given mean and standard deviation. Note that the RATS functions %loggammadensity(x,a,b) and %rangamma(a) use a parameterization in terms of shape and scale, not degrees of freedom and mean. This returns the a and b appropriate for use with those functions.

Gridseries.src

Creates a series with an evenly spaced grid based either upon range and number of points, or range and interval width.

IrelandJEDC2004.zip

Replication program for Ireland (2004), "A Method for Taking Models to the Data", *Journal of Economic Dynamics and Control*, vol. 28, no. 6, pp. 1205-1226. Demonstrates use of **DSGE** instruction, combined with **DLM**, for estimating a dynamic model using maximum likelihood.

LocalDLM.src

Revised syntax for this procedure, which creates the "A", "C" and "F" matrices for a local level or local trend DLM. It also now allows for a separate shock to the level.

MCFEVDTable.src

Computes error bands for the forecast error variance decomposition for a VAR using the information already computed. Note: this assumes that the shocks used are orthogonal and produce a complete factorization of the covariance matrix. It cannot be used with isolated shocks (from, for instance, sign restrictions).

MCGraphIRF.src

Graphs error bands for impulse response functions using the information already computed by another procedure (such as MCVARDoDraws). This has many options for controlling the general layout and content.

MCMCPostProc.src

Post processor for Markov Chain Monte Carlo statistics. Computes means, standard errors, numerical standard errors and CD measures for each component in an input SERIES[VECT] with the generated statistics.

MCVARDoDraws.src

Computes impulse response functions for a VAR using Monte Carlo simulation. This assumes the model is an OLS VAR estimated using the **ESTIMATE** instruction. This uses a Choleski factorization, though it can be modified fairly easily to do any just-identified factorization.

New Examples and Procs, *continued*

Mesa.src

New options and other minor changes. Computes and optionally graphs a spectrum using Maximum Entropy Method.

MountfordUhligJAE2009.zip

Replication file for Mountford and Uhlig (2009), "What are the Effects of Fiscal Policy Shocks?", *Journal of Applied Econometrics* (to appear). Demonstrates analysis of impulse responses with sign constraints, and sign + zero constraints.

NBERCycles.src

Generates dummy variables for quarterly or monthly data based upon the NBER business cycle reference dates. See: www.nber.org/cycles.html

PanCoint.src

Minor update to this procedure for panel data unit root/cointegration testing procedure (Pedroni tests)

SeasonalDLM.src

Revised syntax for this procedure, which creates the matrices for the seasonal component of a DLM.

SimsZhaECM1999.zip

This zip file includes most of the analysis in Sims and Zha (1999), "Error Bands for Impulse Responses", *Econometrica*, vol. 67, no. 5, pp. 1113-1156. Includes calculation of error bands using Monte Carlo integration, bootstrapping and also includes IRF's for a structural VAR.

TsayJASA1998.zip

Replication file for Tsay (1998), "Testing and Modeling Multivariate Threshold Models", *JASA*, vol. 93, no. 443, pp. 1188-1202. Demonstrates the use of the `RLS` (recursive least squares) and `SWEEP` instructions.

UniformParms.src

Returns a 2-vector with the two parameters (lower and upper bounds) for a uniform distribution with the given mean and standard deviation.

VARIRF.src

New options added to this very useful procedure, which organizes graphs of impulse responses for an estimated VAR.

Handbook for *Cointegrated VAR Model*

Katarina Juselius' *The Cointegrated VAR Model* is a wonderful resource for anyone interested in the field of cointegration analysis, and in particular for anyone using CATS and RATS.

We will soon be posting a free RATS Handbook (in PDF format) that works through the various RATS instructions and CATS menu operations required to reproduce the results and graphs shown in the text.

The initial version of the Handbook will cover Chapters 1 through 10, with a revised version to follow covering the remaining chapters. We will also be posting the accompanying RATS program files and the required data files.

We would like to thank Katarina Juselius for providing her original code and data files. Although we've revised that code and added extensive comments, most of the code is essentially unchanged.

Links to the Handbook PDF as well as the program and data files will be posted in mid-September on various locations on our website, including the page for the book:

www.estima.com/Cointegrated_VAR_Model_Book.shtml

They will also be available through the Procedure Browser:

http://www.estima.com/cgi-bin/procbrowser.cgi

RATS Version 7.3, *continued*

New Functions

RATS 7.3 includes several new built-in functions:

%ranTruncate(mu,sigma,lower,upper)

This uses the rejection method to generate draws from a truncated Normal.

%logtdensitystd(V,U,nu)

Standardized log multivariate *t* density. This is equivalent to:

`%logtdensity(v*nu/(nu-2),u,nu)`

%tcdf(x,nu)

Returns the CDF for a *t* distribution.

%ranmvt(f,nu)

Returns a random draw from a multivariate *t* distribution.

%parmslabels(parameterset)

Returns the labels of the variables in the parameter set (see `NONLIN` in the Reference Manual for details on parameter sets).

Two Online E-Courses

We are offering two web-based "e-courses" in the coming months: one on State Space and Dynamic Stochastic General Equilibrium (DSGE) models, and one on Vector Autoregression (VAR) models.

State Space & DSGE Models
September 17 to October 22

The "State Space" part of this course will be based largely on Durbin and Koopman's *Time Series Analysis by State Space Methods* book, supplemented by material from Harvey's *Forecasting, Structural Time Series Models and the Kalman Filter*, and from West and Harrison's *Bayesian Forecasting and Dynamic Models*.

We will spend about four weeks on State Space models and two weeks on DSGE´s. We do recommend that participants have a copy of the Durbin and Koopman book, which is available for purchase through Estima. New lessons will be posted on Thursday of each week starting September 17, 2009.

Vector Autoregression Models,
October 13 to November 17

This course will focus on the "flat prior" types of analysis (we plan to cover informative BVAR's in a future course on forecasting). Topics will include parametric SVAR's, sign-restrictions, short-and-long run restrictions, factor augmented VAR's. New lessons will be posted on Tuesday of each week, starting on October 13, 2009.

General Course Information

Our web-based "e-courses" are taught by Tom Doan, the author of the RATS software. Each course takes place in a private section of our discussion forum accessible only to registered forum participants.

Each week, we will post a new lesson in the form of a PDF document, along with any accompanying example programs, procedure files, and sample data. Course participants can post questions on the forum, which can be answered directly or handled through additional materials. This approach allows you to work through the lessons and examples on your own time and at your own pace, although we do recommend that you try to keep up with the weekly schedule.

The fee for each course is $125.

You will need to have access to version 7.0 or later of RATS. You can register by phone at

    800-822-8038

or on-line at:

    www.estima.com/courses.shtml

RATS Tips

Here are some commonly overlooked facets of RATS that you may find helpful.

Procedures & Examples Supplied with RATS

Many users miss the fact that RATS ships with *hundreds* of procedures and example programs, including the examples presented in the manuals as well as replication code for many textbooks and important papers.

Many of these files are also available on our website, and the search features and the procedure browser there can be very useful for locating files of interest. But, in most cases, using the copy you already have on your hard drive is easier than downloading the files.

With Version 7.2, Windows users will find these files in a folder called "WinRATS 7.20" located in your "My Documents" or "Documents" folder. For older versions, these files are installed in the same directory as the program. By default, something like: C:\Windows\Program Files\Estima\WinRATS

Mac and UNIX users will find these in subfolders of your main RATS folder.

We also provide PDF files describing all of these files. Look for these in the "Manuals" sub-folder. Or, for Windows users, use the links found in the WinRATS folder on your "Start" menu.

WINDOW Options for Output

Many RATS instructions, including `FORECAST`, `PRINT`, and `REPORT` now have WINDOW options, which direct output to a new, spreadsheet style window rather than to the main output window. This can be very handy for doing side-by-side comparisons of series, forecasts, impulse responses, and so on. Also, you can use *File–Export...* to output the contents of these windows in Excel and other formats.

Automatic Procedure Search

Recent versions of RATS can search for procedure files automatically, eliminating the need for explicit `SOURCE` instructions. See Section 16.2.1 in the *User's Guide* for details.