

RATS Version 7.2

RATS 7.2 brings more speed for Windows users, new seasonal adjustment and database capabilities to the Professional versions, and a revised version of our RATSDATA utility.

Big Speed Boost for WinRATS

Thanks to a new compiler that produces more efficient code, Windows users will find that RATS 7.2 handles computations almost twice as quickly as version 7.1 (and earlier).

Below are the execution times (in seconds), for three computationally-intensive tasks:

	Ver. 7.1	Ver. 7.2
Monte Carlo IRFs	101	54
GARCH-Gibbs	22	11
Multivariate GARCH	523	275

As you can see, version 7.2 runs these programs approximately twice as fast as 7.1. You should see similar gains with other programs that spend most of their time doing numerical computations. Programs that spend more time on input/output or database operations may see smaller gains.

The tests were run on a Windows XP system with a 2.4Ghz AMD Athlon 64 3800+ processor. We used three of the example programs supplied with RATS: MONTEVAR.PRG, GARCHGIBBS.PRG, and GARCHMV.PRG. MONTEVAR was modified to do 100,000 draws.

64-bit WinRATS

The Professional version of WinRATS now ships with both 32-bit and 64-bit versions of RATS. Those of you using 64-bit Windows (XP or Vista) can install the 64-bit WinRATS, which can handle much larger data sets if you have sufficient RAM available on your system. Note that there is no speed advantage to the 64-bit version versus the 32-bit.

X12—ARIMA Seasonal Adjustment

The Professional versions of 7.2 include almost all of the features available in the Census X12-ARIMA program, but in the more flexible form allowed by RATS. X12-ARIMA consists of an updated “X11” engine, including log-additive and pseudo-additive adjustments, combined with improved handling of outliers and calendar effects. As with the Census Bureau’s program, the new features have been split between an improved **X11** instruction and changes to **BOXJENK**.

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Impulse Response Sign Restrictions

We’ve had quite a few recent requests for information on some extensions to Uhlig’s sign restrictions approach for impulse responses (Uhlig, “What are the effects of monetary policy on output? Results from an agnostic identification procedure”, *Journal of Monetary Economics*, 2005, vol. 52, pp. 381-419).

To understand the basic idea behind this, consider an N -variable VAR with covariance matrix Σ . Take any factor F of Σ , that is, any matrix with $FF' = \Sigma$. Uhlig shows that the space of “impulse vectors” (a column in an arbitrary factorization of Σ) is characterized by the set of vectors $F\alpha$, where α is a vector of unit length in N space.

To examine the properties of a subclass of impulse vectors which show particular behavior, α ’s are generated randomly (most easily done by drawing an N vector of independent Normals and dividing by its norm) and these are accepted or rejected based upon some set of (sign restriction) criteria on their impulse responses, which can be computed by weighting the responses to the columns of F by the elements of α .

Because this only picks *directions* in α space, the only restrictions that can be handled this way are sign restrictions (comparisons against 0). The example in Uhlig’s paper had > 0 and < 0 constraints. We were asked whether it would be possible to impose some equality ($= 0$) constraints. The answer to that is yes, up to a point. That point is that you can’t impose more than $N - 1$ such restrictions, and probably shouldn’t come anywhere near that.

You can’t blindly pick α ’s as above and filter them out, since the probability of hitting true zero on a linear combination is zero. Instead, you have to pick from a restricted subspace of α ’s. If the constraint is that the (initial) impact is zero for one or more series, there’s a simple way to do this.

Since the factorization F is arbitrary, pick a Choleski factorization that has the variables that you want to constrain listed first. Say we want to constrain the impact responses on variables 1 and 2. Draw an α from N space, zero out the first two components and normalize it. (Alternatively, draw from $N - 2$ space, add two zeros at the front, and normalize it). That can be done with the following instructions:

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RATS 7.2, continued**FRED Database Support**

The Professional release of RATS 7.2 adds support for accessing the St. Louis Federal Reserve Bank's FRED® database. You can browse through the on-line catalog, view and graph data, and drag and drop data series into a RATS format file. For details on the data see: <http://research.stlouisfed.org/fred2>

BOXJENK

This includes several new options for “RegARIMA” modelling and automatic outlier detection. In RegARIMA modelling, the emphasis is on the “regression” model more than on the time series model for the errors. You can now extract the equation for the mean separately from the ARIMA model. You can also do automatic outlier detection, scanning and adjusting for additive, level shift, and temporary change outliers.

We've also optimized **BOXJENK** to run much faster, particularly when you have seasonal components.

DSGE

This instruction, which we introduced in version 7, has had a number of improvements to its computational capabilities, and provides clearer reporting of any errors found in the model. Version 7.2 also adds an ETZ option, which produces the matrices needed to adjust the model for known exogenous shocks. Thanks to Stephen Murchison of the Bank of Canada, whose very large model helped us greatly improve the workings of the instruction.

New Wizards

We've included new wizards for unit root tests (selecting among seven popular tests), kernel density estimation, and non-parametric regression.

New Functions

`%DLMGfromA` analyzes a state transition matrix from a state-space model and produces the “G” matrix which transforms the model to its stationary states.

`%MSPEexpand(P)` takes the reduced size $N-1 \times N$ matrix of transition probabilities (parameterized that way for estimation purposes) and expands it to a full $N \times N$ matrix.

We've added several functions which may help people translating programs to RATS from other software:

`%RESHAPE(matrix, rows, cols)` changes the dimensions of an array (usually from rectangular to vector or vice versa). `%SUMC(matrix)` sums across columns and `%SUMR(matrix)` sums across rows.

RATS 7.2: Prices and Ordering

If you have a single-user license of version 7.0 or 7.1, the CD update to version 7.2 is just \$25 (postage included).

If you have an older license (6.35 or older), the basic price to update a single-user license from *any* older version of RATS is just \$150. This includes the software plus a new set of documentation.

You don't have to have the older software still installed in order to get an update. You *do* need to have the serial number. If you cannot find your serial number, contact us at sales@estima.com or 800-822-8038 before placing your order.

Shipping is free for destinations in the contiguous U.S. Add \$30 for shipping to Alaska, Hawaii, Canada, and U.S. possessions, and \$50 for shipping to other countries.

If you have the standard version of RATS, you can upgrade to the Professional version for an additional \$150 (single-user licenses). The Pro version gives you the X12 seasonal adjustment capability, ODBC/SQL support, support for reading and writing FAME data files, and the ability to read CRSP and FRED databases.

	What you want:	
What you have:	RATS	RATS Pro
RATS Pro v. 7.0 or 7.1	—	\$25
RATS v. 7.0 or 7.1	\$25	\$150
RATS Pro (earlier)	—	\$150
RATS (other, earlier)	\$150	\$300

Please contact Estima if you have questions, or need to update a multi-user or UNIX/Linux license.

Update Subscriptions

Update subscriptions provide a convenient way to budget your software expenditures, and are the easiest way to ensure that you receive all updates to RATS as soon as they are released. We offer two forms of update subscriptions: version and annual.

Most (current) multi-user licenses are on annual subscriptions. These provide all updates for one year. The expiration date for this will usually be on the label on the CD envelope. If you (think you) need to renew yours, please contact us for pricing.

Single-user licenses are generally handled using the version subscriptions, which provide all updates up to and including the next major release. If you currently have version 7, a version update subscription would be \$150 (plus shipping for customers outside the U.S.) and would give you all updates up to and including version 8.0.

Upcoming E-Course

Our first e-course will be starting April 16, running for six weeks, through May 21. The topic will be “Bayesian Econometrics”. During the six weeks, we will be working through Gary Koop’s book of that title (2003, Wiley and Sons). We have this available for sale if you need a copy.

The fee for the course is just \$125. Each week on Thursday (U.S. time), we will post the new lesson, with data, discussion, programs and procedures. We’ll have an on-line forum specifically set up to answer questions and provide updates over the course of the week. You will need to have access to version 7.0 or later of RATS.

You can register by calling us at 800-822-8038, or on-line at:

www.estima.com/courses.shtml

New or Improved Procedures

The biggest news here is that the very popular MSVARSetup procedure (for Markov-switching VAR’s) has been completely rewritten. It now executes much faster, and includes support both for EM and for standard maximum likelihood estimation. The companion MARKOV.SRC procedure file (which includes more general support routines for Markov switching models) has also been revised.

One of our other popular procedure files (BRYBOSCHAN.SRC) for Bry-Boschan business cycle analysis has been updated to handle quarterly as well as monthly data.

We added or revised quite a few procedures for ARIMA models as part of the work on X12-ARIMA. The most important addition is GMAUTOFIT.SRC, which does an automatic fit of a multiplicative seasonal ARMA model, following the procedure described by Gomez and Maravall. This is very similar to what is done in their software TRAMO.

New Paper Replication Files

`campbellammerjof1993.zip` consists of the data file and several program files for Campbell and Ammer (1993), “What Moves the Stock and Bond Markets? A Variance Decomposition for Long-Term Asset Returns”, *Journal of Finance*, vol. 48, pp. 3-37.

`krolzigmsvar.zip` has the data file and program files for the Markov Switching VAR’s estimated in Krolzig (1997), “International Business Cycles: Regime Shifts in the Stochastic Process of Economic Growth”, Oxford University Discussion Paper. These demonstrate the new capabilities of the MSVARSETUP.SRC package for MS VAR’s.

Sign Restrictions, *continued from 1*

```
compute alpha=%zeros(1,2)~%ranmat(1,n-2)
compute alpha=alpha/sqrt(%normsqr(alpha))
```

In greater generality, suppose that the restrictions can be written in the form $\mathbf{R}\alpha = 0$. As an example, suppose we want the impact responses on variables 1 and 2 to be equal. The 1st and 2nd components of $\mathbf{F}\alpha$ are those responses, so we want the restriction matrix to be $\mathbf{R} = (1, -1, 0, \dots, 0)\mathbf{F}$.

The space of α which satisfy $\mathbf{R}\alpha = 0$ can be written in the form $\mathbf{R}^+\theta$, where θ is an $N-1$ vector. Draw θ randomly, compute $\mathbf{R}^+\theta$ and normalize it and you have a draw for α . And those are drawn uniformly on the unit sphere from the restricted subset. This is an example of this with $N = 5$.

```
compute f=%decomp(s)
compute rperp = $
%perp(| | 1.0, -1.0, 0.0, 0.0, 0.0 | | *f)
compute alpha=rperp*%ranmat(4,1)
compute alpha=alpha/sqrt(%normsqr(alpha))
```

New Version of RATSDATA

Version 7.2 of RATS includes a new version of the RATSDATA data-management utility program, offering the following improvements:

New View Menu

The new *View* menu includes a new *Reset List...* operation that gives you greater control over the series list display. As before, you can limit the display to only those series whose names match a template, or whose comments contain specific text. But you can now also filter the list by frequency and/or by starting and ending year.

Full Undo/Redo Capabilities

You can now Undo and Redo any editing operation available in RATSDATA. For example, if you delete a series, you can undo that deletion using the *Edit—Undo* operation. Similarly, any edits made to the values of a data series can be undone (and redone, if desired).

Improved “Form Panel” Operation

The *Form Panel* operation stacks a set of selected series into a panel series. In 7.2, you can now control how series with differing starting and ending dates are handled, selecting a full (possibly unbalanced) panel, or restricting yourself to ranges which give balanced panels.

Find Operation

The new *Find* operation on the *Edit* menu allows you to search for a particular value in the selected series.

Note that most of these also apply to editing or browsing RATS format files within RATS itself.

Textbook News

Two of the textbooks on our “recommended” list are now out in new editions. Marno Verbeek’s *A Guide to Modern Econometrics* is now in its 3rd edition, while Chris Brooks’ *Introductory Econometrics for Finance* is now out in a 2nd edition. Chris has also written a *RATS Handbook for Introductory Econometrics for Finance*, which should be of interest to many RATS users.

These are available through our website.

Introductory Econometrics for Finance, 2nd ed.

By Chris Brooks

Designed to teach introductory econometrics to finance majors, this book is data- and problem-driven, giving students the skills to estimate and interpret models as well as a grasp of the underlying theoretical concepts. Its easy-to-follow style and numerous examples make this a great starting-point for non-specialists.

It assumes no prior knowledge of econometrics, and covers important modern topics such as time-series forecasting, volatility modelling, switching models and simulation methods. The book includes detailed examples and case studies.

The new second edition has been fully revised and updated, and includes new chapters on limited dependent variables models and panel methods, and makes use of new case studies from the finance literature. The accompanying web site now includes all of the data used in the worked examples, as well as other supporting materials.

RATS Handbook for Intro. Econ. for Finance

By Chris Brooks

The *Handbook* provides a comprehensive introduction to the use of the RATS software for modelling in finance and beyond. Written to complement the second edition of *Introductory Econometrics for Finance*, it includes numerous worked examples with carefully annotated code.

The book does not require any prior knowledge of RATS, and begins with an exploratory introduction to the software followed by illustrations of how to conduct regressions and run simple tests.

Detailed explanations of the outputs give readers the knowledge and confidence to use the software for their own research and to interpret their own results. A wide variety of approaches are covered in the later chapters, including time-series analysis and forecasting, volatility modelling, limited dependent variable and panel methods, switching

models and simulations methods. The example data sets and RATS programs are freely available on the associated web site.

A Guide to Modern Econometrics, 3rd edition

By Marno Verbeek

A Guide to Modern Econometrics has become a highly successful textbook over time. It serves as a guide to alternative techniques in econometrics with an emphasis on the practical application of these approaches.

In this new edition, Marno Verbeek builds on the strengths of the second edition and brings the text completely up-to-date. For tough subjects, like multicollinearity and instrumental variables, the exposition is further improved, and much new material is added, for example on panel data, pseudo panels and instrumental variables.

This edition also contains several new empirical illustrations on dynamic panel modeling, discrete choice models, model selection and forecasting. The book’s website now provides more than twenty-five real-life data sets used for illustrations and exercises, plus new supplementary material for instructors, including PowerPoint slides and solutions to selected exercises.

Bayesian Econometrics

By Gary Koop

Bayesian Econometrics introduces the reader to the use of Bayesian methods in the field of econometrics at the advanced undergraduate or graduate level. The focus is on models used by applied economists and the computational techniques necessary to implement Bayesian methods when doing empirical work.

This is a very “computer” oriented introduction to the subject. After checking quite a few competing books, we chose this as the basis for our e-course in Bayesian Econometrics. (See the story on page 3).

The RATSletter

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