

RATS 10

Fast, Easy, Flexible, and Reliable Time Series and Cross-Sectional Data Analysis

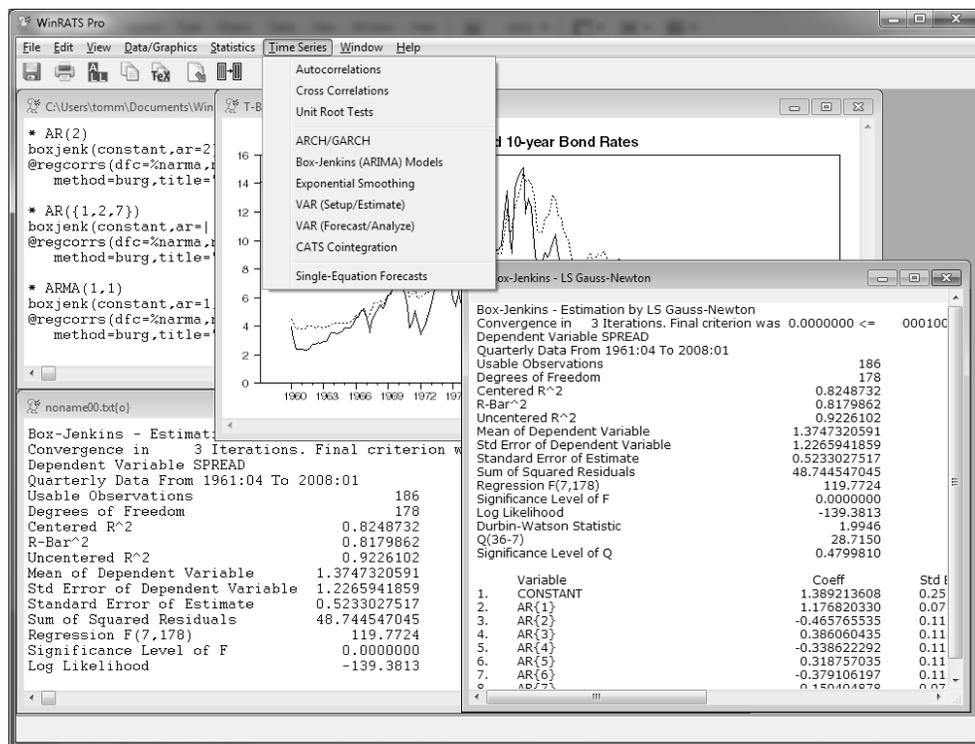
RATS provides all the basics, including linear and non-linear least squares, forecasting, and ARIMA models, but goes far beyond that with support for techniques like GMM, ARCH and GARCH, vector autoregressions (VARs), spectral analysis, state space models and DSGEs, and much more.

It can handle time series of virtually any frequency, including daily and weekly, as well as panel data, and produces publication-quality graphs for printing or importing directly into word processors.

Menu-driven “Wizards” provide a point-and-click interface for many common tasks, making RATS an ideal tool for new users and for educational settings.

Meanwhile, the powerful command-driven language at the heart of the program remains easy to learn and use for simple jobs, while also allowing users to automate complex or repetitive tasks and even write sophisticated menu- and dialog-driven end-user applications.

RATS is available for Windows, Macintosh, UNIX, with complete compatibility across platforms.



The RATS v.10 interface. Here, the sequence of commands appear in one text window, with the output directed to another window. This makes it easy to save commands as a complete program, which you can rerun with a couple of mouse clicks. Also visible are a report window showing the output from a Box-Jenkins estimation, a graph window, and a look at the wizards on the Time Series menu.

Major Improvements Since Version 9.0 Include:

- Greatly expanded Help, with annotated descriptions on many of the main examples.
- Irregular dated data (typically daily with non-trading days omitted) can now be processed with the dates.
- Direct access to the FRED on-line database.
- The OECD MEI database can be downloaded directly.
- Simulated annealing and genetic annealing optimization methods have been added.
- Graphics can be exported as PDF and PNG (in addition to PostScript and Windows Metafile).
- Data in reversed time order (for instance, from Yahoo Finance) can be processed.
- Many more types of GARCH models can be estimated directly.
- Graphics: there are now no limits on the number of series which can be included in a graph. Custom month labels (such as language-specific) can be employed.
- Bootstrapping has been made simpler.

For More Information, or to Place an Order:

RATS is available directly from Estima, and from resellers around the world. We offer single-user, multi-user and network licenses, as well as several options for using RATS in instructional settings, including discounts for full-time students.

For more information, please visit our web site at:

<http://www.estima.com>

or contact us by phone, fax, mail, or email:

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RATS Version 10 Features

Statistical Methods

Estimation Techniques

- Multiple regressions including stepwise
- Regression with autoregressive errors
- Heteroscedasticity/serial-correlation correction, including Newey-West
- Non-linear least squares
- Two-stage least squares for linear, non-linear, & autocorrelated models
- Seemingly unrelated regressions and three-stage least squares
- Non-linear systems estimation
- Generalized Method of Moments
- Maximum likelihood estimation
- Constrained optimization
- Extensive built-in hypothesis testing, with procedures for a huge variety of unit-root, stability, and other tests
- Limited and discrete dependent variable models: logit, probit, censored/truncated data (Tobit), count models
- Panel data support, including fixed and random effects estimators
- Non-parametric regressions
- Kernel density estimation
- Robust estimation
- Recursive least squares
- State-space models, including Kalman filtering and smoothing, simulations, and optimal control models
- DSGE models
- Neural network models
- Linear and quadratic programming

Time Series Procedures

- Easy to specify lags and leads for time-series model estimation and analysis
- ARIMA and ARMAX models including multiplicative seasonal models; support for arbitrary lag structures
- Transfer function/intervention models
- Error correction models
- Kalman filter
- Spectral analysis

Forecasting

- Time series models
- Regression models
- Exponential smoothing
- Static or dynamic forecasts
- Simultaneous equation models (unlimited number of equations)
- Simulations with random or user-supplied shocks
- Forecast performance statistics, including Theil U statistics

Vector Autoregressions (VARs)

- Unmatched support for VAR models
- (Vector) Error Correction models
- Structural VARs, either parametric or determined by long- and short-run restrictions.
- Impulse responses, with different techniques for standard error bands.
- Forecasting
- Variance decomposition
- Historical decomposition

ARCH and GARCH Models

- Univariate and multivariate, including BEKK, diagonal, CC, DCC, and VECH multivariate models
- Support for GARCH-in-mean models
- Additional exogenous variables in mean and/or variance equations
- Normal, t and GED distributions
- Exponential and Asymmetric models
- Robust standard errors

Working With Data

Data Entry

- Menu-driven Data Wizards for reading in data
- Reads and writes Excel files, text files, EViews®, Stata®, and other formats
- Pulls data directly from FRED® on-line database
- Pro version supports SQL/ODBC
- On-screen data viewer and editor, with point-and-click graphing and statistics tools
- Can handle virtually any data frequency, including daily, weekly, intra-day, and panel data
- Can automatically convert data to different frequencies
- RATS data file format is fast and easy, supports all frequencies, and allows you to store series of different frequencies on the same file.

Data Transformations

- Flexible transformations with algebraic formulas
- Easy to create trend series, seasonal, and time period dummies
- Extensive filtering operations, including Hodrick-Prescott, Henderson, Spencer, and custom filters
- Supports regular, seasonal, and fractional differencing

Graphics

- High-quality time series graphics

- High-resolution X-Y scatter plots
- Dual-scale graphs
- Contour graphs
- Copy-and-paste graphs into other applications
- Export graphs to many formats, including PostScript, PDF and Windows Metafile
- User can customize attributes such as line thickness, colors and grayscale levels, and fill patterns

Interface

Interactive Mode Environment

- Text-editor based
- Point-and-click “wizards” for many tasks, greatly enhancing ease-of-use
- Saved programs can be re-run with just a few mouse clicks
- Designed so that you can reproduce results, output, and graphs easily *and* accurately—a critical but often overlooked requirement for producing reliable, publication-quality results
- True multiple window support. Simultaneously view your input commands and output, spreadsheet-style “report” windows, graphs, and more

Programmability

- Extensive looping capabilities and support for applying operations to lists of variables make it possible to automate many repetitive tasks
- You can write *procedures*, which can perform complex tasks with a single instruction, and write your own callable functions.
- A library of procedures written by RATS users from around the world is available free of charge on our web site
- A variety of interface-related instructions allow you to create your own drop-down menus, custom dialog boxes, and more

RATS Professional

The Professional versions of RATS add the following features not found in the Standard version:

- 64-bit version, with increased capacity and speed.
- Support for CRSP database
- ODBC/SQL database support
- Census Bureau X12 seasonal adjustment routine
- Support for FAME data files (for Windows and UNIX/LINUX)

Free Technical Support, No Required Maintenance Fees

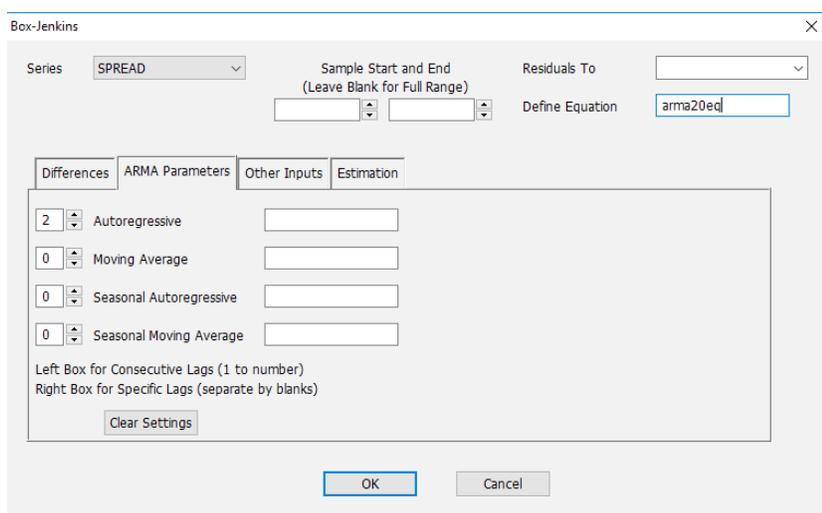
Estima supplies expert technical support at no additional charge for as long as you own the software. Most questions are answered within one day. Users can also participate in web-based discussion forums with RATS users from around the world.

And a standard license to use RATS will never expire—there are never any required maintenance or licensing fees to continue using the software. (We *do* offer time-limited versions for classroom use).

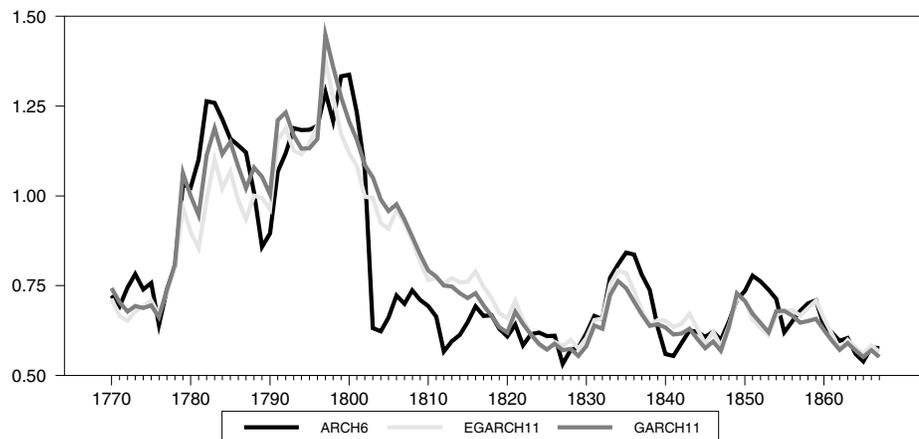
Flexible Update Policies

Minor updates are made available for a small fee, while more significant updates are offered at very reasonable prices. Updates are always optional.

For users who want to stay up to date automatically, we also offer **Update Subscription** programs, which make it easy to budget software purchases and provide you with all updates as soon as they are released.



The Box-Jenkins/ARIMA Wizard provides an easy way to estimate ARIMA and ARMAX models, including models with transfer function or intervention terms.



A sample time-series graph. Here, we've used the graphics style sheet feature in RATS to select thicker lines in shades of gray to represent the three series. Because the series cross each other so frequently, the dash patterns that are the standard for black and white lines wouldn't look as good. We've used another option to place a key at the bottom of the graph.

Supported Platforms

RATS for Windows

WinRATS runs on Windows XP, Vista, Windows 7, 8 and 10. Pro versions include 64-bit version.

RATS for Macintosh

MacRATS is a "Universal" application and runs on any Intel-based Mac, running OS X 10.9 or later. It requires a hard drive with at least 250MB of free space.

RATS for UNIX and Linux

RATS is available for almost all UNIX and Linux systems, and now includes the same interactive-mode environment previously available only for Windows and Macintosh.

The Linux and UNIX versions require a hard drive with at least 250MB free. The Gtk windowing libraries are required for interactive mode use. The UNIX version requires that you have a C compiler to compile the source code.

Pricing

Please refer to our website or your local reseller for prices for Version 10 of RATS.

<https://estima.com/ratsprices.shtml>

CATS 2.0 Cointegration Analysis Procedure

CATS (Cointegration Analysis of Time Series) is a sophisticated set of RATS procedures which implement the popular Johansen and Juselius cointegration analysis techniques.

Version 2.0 was written by Jonathan Dennis, Katarina Juselius, Soren Johansen, and Henrik Hansen of the University of Copenhagen, and is distributed and supported by Estima.

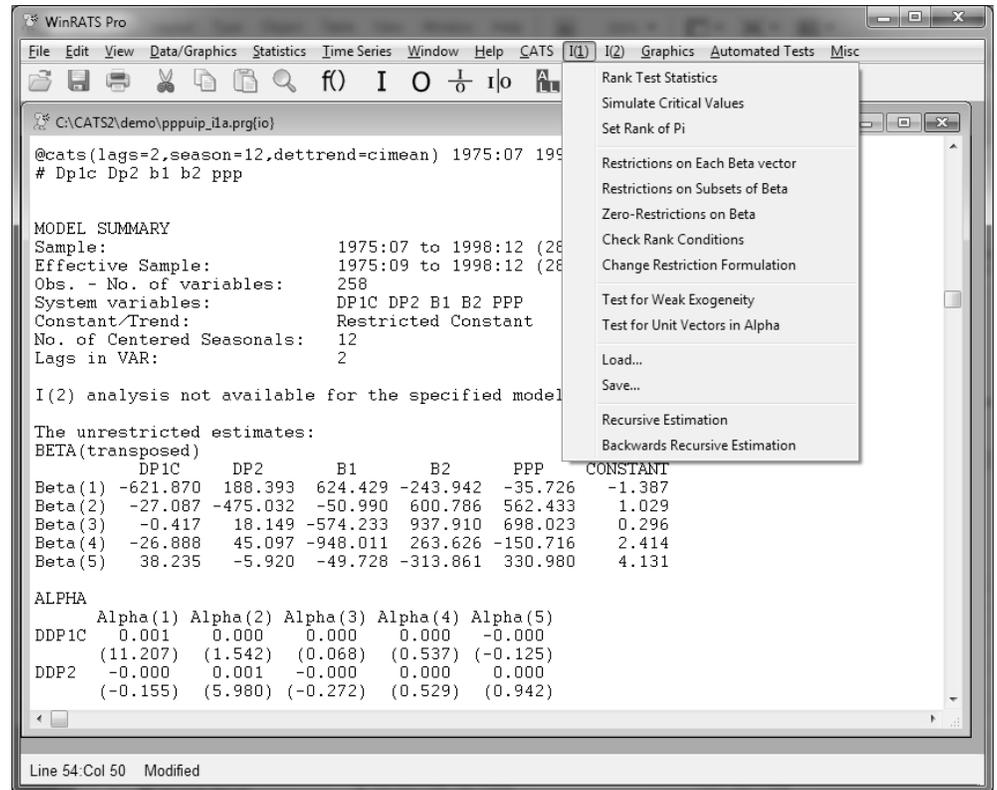
CATS is almost entirely a menu and dialog-driven procedure. You use standard RATS instructions to define the frequency, read in data, and do any necessary transformations. You then “source” in and execute the CATS procedures. From there, the rest of the analysis is done by selecting operations from the CATS pull-down menus, and entering information in pop-up dialog boxes.

The Johansen–Juselius approach to cointegration is based on the error-correction form of a Gaussian vector autoregression. In particular, they analyze the decomposition of the matrix of error-correction coefficients Π into $\alpha\beta'$. The I(1) procedure supports partial systems, and makes it easy to specify weakly exogenous variables. You can also include dummy variables, or stationary dummy-type variables.

To help you choose a model, CATS provides eigenvalues and trace test statistics for reduced rank (as well as 90% critical values if requested) and unrestricted estimates of α , β , and Π . You can check the model by calculating multivariate test statistics for residual autocorrelation, normality, and ARCH. Version 2 even provides an automated model selection routine.

Additional features include:

- Auxiliary procedures for multivariate tests of long-run exclusion, weak exogeneity and stationarity, and for calculating eigenvalues and trace statistics for five different hypotheses.
- Ability to set and reset the rank of Π throughout the analysis, and a variety of tests to help you determine the “correct” rank order.
- Graphical analysis tools, including plots of the β -vectors to check stationarity, and of residuals to locate possible problems with the Gaussian assumption, plus correlograms and autocorrelograms.



- Descriptive statistics include: residual correlation matrices, the short-run parameters and associated t -values, estimates of the C -matrix (with asymptotic t -values) in the common trends representation, and the long-run covariance matrix.
- Structural tests, including non-identifying restrictions on β , identifying restrictions on β , and weak-exogeneity hypotheses on α .
- Supports recursive cointegration analysis, with tests for the constancy of the eigenvalues, stability of the estimated cointegration space and the estimated parameters, and the adequacy of the predictions from the model.

The CATS package includes the CATS procedures, a 200-page user’s manual, and sample data and program files.

CATS requires Version 6.2 or later of RATS, and is available for Windows, Macintosh, UNIX, and Linux. Please contact us if you have any questions about CATS or RATS, or check out our website to order online.

<https://estima.com/shopcart/webordercart.shtml>

Online Courses and Resources

Over the past few years, we have provided several popular online courses focused on particular topics in econometrics. The following sets of course materials, developed from our web-based courses, are now available for order. Each package includes the PDF handbook containing the lecture materials, as well as all of the example programs, data sets, and RATS procedures used in the course and are delivered by e-mail download.

Please see <https://www.estima.com/courses.shtml> to order any of these materials via our website.

ARCH/GARCH and Stochastic Volatility Models, 2nd Edition

This examines the practical and theoretical issues with estimating and using ARCH, GARCH, and stochastic volatility models. It covers many variants of univariate and multivariate GARCH estimation, including specification of the variance and mean models, overcoming numerical issues, and diagnostic checking.

The course also explains the workings of the Gibbs sampling and bootstrap examples that are provided with RATS, both for inference on the model parameters and for inference on out-of-sample behavior (such as calculation of Value at Risk). The second edition describes some of the recent additions to the **GARCH** instruction, tests for spillover in mean and variance, methods for handling extreme outliers, VECM-GARCH models, and much more.

Bayesian Econometrics

This course workbook covers most of the most important methods now used in Bayesian analysis in econometrics, including Gibbs sampling, Metropolis-Hastings and importance sampling. The applications are to a broad range of topics, include time series, cross-section and panel data. It assumes that the user is comfortable with such basic instructions as **COMPUTE**, **DISPLAY**, **GRAPH**, **SCATTER** and **LINREG**, and can use simple programming techniques such as **DO** loops. In each chapter, there is a Tips and Tricks section which covers in greater detail any functions or instructions that might be unfamiliar.

The presentation is based largely on Gary Koop's *Bayesian Econometrics* (Koop 2003). We've added to that in several areas, with a chapter on vector autoregressions, and examples from the literature for panel, cross-sectional data and state-space models. In most cases, we've included much of the statistical derivations from the book, presented in a way to highlight the calculations as they are done with RATS, so even those without the book can benefit.

Panel and Grouped Data

The course covers the techniques of panel data econometrics, with an emphasis on the "time-series" aspects, including Dynamic Panels, Unit Root Tests, Cointegration, and VAR's. We also demonstrate the use of Gibbs sampling for panel data, including linear and non-linear random effects, random coefficients models, and applied to VAR's.

State Space and DSGE Models, 2nd Edition

The "State Space" part of this course is 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*. Roughly two-thirds of the course is devoted to State Space models, with the remainder focusing on DSGE models.

The second edition has new sections on "gap" models with univariate models, bivariate models for gap plus Phillips curve and non-linear dynamic models, detailed discussion of Gibbs sampling methods, particle filters and Kalman filtering with constraints on the states.

Structural Breaks and Switching Models, 2nd Edition

This course deals with a range of topics including outlier detection, intervention modeling in various models, tests for structural breaks and threshold effects, estimation of threshold and smooth transition models and endogenous Markov switching models. It covers both maximum likelihood and Bayesian estimation techniques.

The second edition adds coverage of the ICSS test for variance breaks, greatly expanded detail on computation of non-linear impulse response functions in various threshold models and a completely rewritten section on Threshold VAR's. The section on Markov Switching GARCH models has been completely rewritten to explain the difference between the more accurate "Dueker filter" and the more commonly used "Gray filter" with application to the same data set to demonstrate that.

VAR Models, 2nd Edition

This is the 2nd edition of our most popular course. This covers identifying and estimating VAR models, computing impulse responses and variance decompositions, historical decomposition and counterfactual simulations, structural and semi-structural VARs, and sign restrictions.

The Vector Autoregression (VAR) was introduced to the economics literature in the famous paper "Macroeconomics and Reality" (Sims 1980). Since then it, and its close relatives, have become the standard for analyzing multiple time series. Even when more complicated and tightly parameterized models are used, it's the stylized facts gleaned from VAR analysis that they are expected to explain.

In this course, we examine techniques that use "flat priors"; that is, the techniques designed to elicit information from the data without the use of informative Bayesian priors. Strongly informative priors (such as the so-called Minnesota prior) are widely used for building forecasting models, but they tend to improve forecasts by shutting down much of the cross-variable interaction. The techniques we examine are designed primarily to analyze precisely that type of interaction. Topics added in the 2nd edition are Kilian (1998)'s bias-corrected bootstrap, greatly expanded coverage of structural var's, "medium-run" constraints combined with the more commonly-used impact(short-run) and long-run constraints, and greatly expanded coverage of sign-restrictions, include coverage of zero constraints (in addition to the sign constraints) and calculation of the Fry-Pagan median target responses.