This review originally appeared in the International Journal of Forecasting 7 (1991)

International Journal of Forecasting 7 (1991) 395-398 North-Holland

Software Reviews

AUTOBOX 3.0 - AFS, Inc., P.O. Box 563,
Hatboro, PA 19040, USA.
(215) 675-0652

List Price $195.00 - $695.00 depending on number of observations and data series selected. The base price for the automatic version is $395 increasing to $1,195. Requirements are an IBM PC, PC-AT, PS/2 or compatible with 500K of free RAM,PC or Ms-dos, and a hard disk with at least 3 megabytes of free space. A coprocessor is not required but is used if available. SunSparc Station and IBM RISC 6000 versions are available. Also, the vendor has extensive experience customizing AUTOBOX 3.0 to inter- face with a user's mainframe.

The bottom line

AUTOBOX 3.0 is a watershed product. It is the most sophisticated, powerful, and flexible time series program available today. The embedded expert artificial intelligence module identifies and estimates single and multiple time series models (sometimes called dynamic regression or dynamic distributed lag models) which satisfy the necessary and sufficient conditions imposed by the underlying assumptions. The program's structure faithfully replicates the theoretical foundations of time series model building. It allows the user's control over each step of the investigation from the creation of the data series through the printing of the final reports.

The program's design permits the novice user to complete an investigation of a single or multiple data series following the tenants of time series analysis. The sophisticated data handling characteristics make AUTOBOX 3.0 uncommonly attrative to the application forecaster responsible for many data sets with widely varying underlying structures. Finally, the academic researcher will find the program uses advanced statistical techniques which will provide the support for papers meeting the rigorous requirements of academic journals.

Characteristics of AUTOBOX 3.0

AUTOBOX 3.0 is a microcomputer time series software program targeting the student, the academic researcher, and the applied forecaster. The program arrives on one high density diskette. A menu driven installation program installs the program on the drive and subdirectory selected by the user. AUTOBOX 3.0

includes four data bases containing a total of 78 separate data series. The analyst will recognize many of the included series from their being widely used in time series research. The program displays on CGA,EGA,VGA, and Hercules graphics monitors. Program output will print to all printers, including HP Laser printers. AUTOBOX 3.0 is copy protected and site licenses are available. The program will run either interactively using menus or from a command version.

Data handling

AUTOBOX 3.0 includes advanced data management features. One of these is common to all statistical programs while two are not. The user may create, select, modify, write, or delete a databw or data series. A database is where the analyst stores individual data series. This option is especially useful by permitting the user to organize the data series in a logical hierarchy. For example, the user may create a database named week and in it store all series which have a frequency equal to one weelc. The user may store monthly data series in a database named month.

The program accepts data as ASCII, LOTUS (including version 3.0), and keyboard entry. The program creates its own file structure. Data sets may be exported in the same formats. The user specifies the name of the data series and its beginning date by year and frequency. A series' observations and other information such as its name, the name of other fields (see the following discussion of felds) may be edited from the keyboard. One helpful characteristic is the ability of the program to record data series as regular, deterministic, or as a function. Transformation of a data series uses any of the DOS function commands.

One true innovation in AUTOBOX 3.0 is its ability to assign fields to databases. Think of a field as a third dimension where the first dimension is the database name, and the second is the observations. A feld is a user specified place to record additional information about a data series. Consider a business with a broad product line operating in different states. The presence of fields permits the user to tag a series by product type, location, and any other user designated identifier.

The presence of fields ties to the AUTOBOX 3.0 option permitting the user to select data series by specifying a filter. If the user defines one field as a state and another as the type of pizza, then a filter could select all series meeting a filter equal to field code for pepperoni in all states while another filter selects only the pepperoni and cheese pizza codes for a subset of states. The combination of fields and filters offers a powerful tool to the application forecaster responsible for forecasting thousands of data series. Fields permits the user to select many series using one command in contrast to selecting each series separately.

Statistical capabilities

While the program's data management techniques and documentation of AUTOBOX 3.0 are exemplary, the statistical capabilities of the program are its real power and the source of its contribution to the profession. AUTOBOX 3.0 is a genuinely different program from the usual regression and time series program like Minitab, SCA, SYSTAT, RATS, Modler, Micro TSP, Soritec, ESP, Autocast II, Forecast Master, Forecast Pro, Forecast Plus, SPSS, SAS, and others. AUTOBOX 3.0 applies true time series analytical techniques to time series data in contrast to the usual application of ordinary least squares technigues to time series data.

Multivariate time series expressions, i.e., transfer functions, are the most general of all functional forms relating a dependent to independent variables. Functional forms beginning with the simple bivariate OLS model and extending to complex multivariate distributed lag models including those with parameters for correcting for serial correlation are all special cases of transfer functions. True time series techniques as provided by AUTOBOX 3.0 offer the analyst the flexibility to filter quickly and efficiently among many candidate functional forms. Note that the program offers the same advantages when analyzing univariate series.

The academic scholar and the applied researcher know the limitations of applying static OLS techniques to summarize dynamic relationships in time series data. The academic recognizes that OLS yields models that usually violate one or more of the underlying assumptions. Many econometric texts are compilations of fix-up techniques which remedy OLS deficiencies - serial correlation repaired with Cochrane-Orcutt or Hildreth-Lu techniques, weighted least squares eliminates heteroscedasticity, and instrumental variables regression corrects for stochastic regressor problems. The application forecaster recognizes the deficiencies when they determine that OLS models have large forecasting errors. AUTOBOX 3.0 offers the investigator the tool to overcome the deficiencies inherent in classical regression techniques.

The program includes an artificial intelligence heuristic which applies the Box-Jenkins methods to the analysis of both single and multiple series. The commanding database management module and the automatic modeling features permit the user to apply the power of time series analytical techniques to large data bases. Until now, large data bases limited the analyst to using simple prespecified OLS models or applying advanced time series techniques to a few data series. AUTOBOX 3.0 overcomes both of these constraints.

AUTOBOX 3.0 calculates and reports in graphs or tables all of the usual statistics necessary to identify, estimate, diagnosis, and forecasts time series models. All statistics necessary to verify all of the undrlying assumptions are available for review. One authoritative statistical feature is the program's option to identify and estimate step, pulse, and seasonal pulse intervention variables automatically. The user controls the level of significance for identifying intervention variables. Another unique feature of AUTOBOX 3.0 is the ability to identify the presence of interventions in the residual series after a transfer function with the usual independent regressors is estimated. The academic will

find this tool useful when searching for the presence of shocks in a residual series. The applied researcher will find this useful when identifying and measuring the effects of strategic marketing tactics.

The novel features of AUTOBOX 3.0 may be put into two groups. The first group includes the distinctive data base management fields feature, the automatic estimation and forecasting feature, the faithful allegiance of the program's steps to the analytical steps required by the theoretical foundations, and the user's control over all phases of the analysis.

The second novel feature firmly establishes that AUTOBOX 3.0 offers the analyst routines which are at the cutting edge of statistical research. The program insures the stability of the model's residuals following the recent work by Tsay. The program identifies shifts in the variance of the residuals and calculates the weights necessary to make it stable. Allied with this option is the ability to estimate the Box-Cox transformation parameter. The Box-Cox parameter is useful for modeling a series where its variability (dispersion) is level dependent (central tendency). Both the Box-Cox transformation and Tsay's weighted regression are techniques to stabilize the variance of the residuals. While the optimal combination of the Box-Cox transformation and the regression weights has not yet been conclusively established, AUTOBOX 3.0 includes the tools for the analyst to investigate the conditions further.

Reports

Another important contribution AUTOBOX 3.0 makes to the applied forecaster and the academic researcher is its report writing flexibility. First, the analyst controls the printing of each report. All of the exact user specified conditions of identification, estimation, diagnosis, and forecasting are available for printing either to the monitor or to a file. Included in this option is the ability to print the results of each intermediate step during automatic identification and estimation. When teaching time series analysis, it is particularly important to have a copy of all intermediate steps so the student can link the identification statistics to the estimation and diagnosis tasks.

Second, the program automatically calculates and stores about 20 statistics. The user can use these to create other statistics tailored to resolving a particular problem. This option frees the user from being limited to the statistics written in the code. The program's custom report writing option enhances the versatility of the user defined statistics. This option permits the analyst to create report which prints the new statistics for different data series in a specified order.

For example, a custom report can print the average absolute percent error statistic for each series and to rank the series in either ascending or descending order. This commanding feature is a forceful tool in the hands of the applied forecaster faced with identifying the forecasting accuracy of hundreds or thousands of series. The program delivers the forecast accuracy for different lead times enabling the analyst to assess the

average reliability K periods into the future. This is a unique feature not available on other software packages. Note this is an addition to the standard error statistic for multiple period forecasting from a single origin.

Documentation

AUTOBOX 3.0 has three levels of documentation. The first is an extensive set of on-line help screens. A help screen exists at every cursor position where the user makes a selection from a menu. A novice user can execute the program by referencing the help screens. Allied with the help level of documentation is a complete tutorial option plus another replay option which guides the user through a live session. For the academic instructor, the help screens, along with the two other following items, is the nucleus of the classroom materials necessary to teach a course in time series analysis.

The second level of documentation is the user's manual. This document links the structure of time series analysis to the flow of the program. This is especially helpful when an instructor uses AUTBOX 3.0 when teaching time series analysis. Furthermore, the user's manual includes the sources of all data series and an extensive reading list.

The third level of documentation is the reference manual. This document develops the theoretical foundation of time series analysis and links it to the menu selections.

Finally, the vendor offers extensive telephone support. Included in telephone support is an opportunity to engage the vendor's professional staff in technical conversations about the intricacies of time series analysis.

Ease of use

Single and multiple time series analysis is inherently more difficult to apply than classical regression techniques. The structure of AUTOBOX 3.0 along with the extensive help screens overcome many of the usual stubling blocks. Selection among the hierarchy of menus steadfastly follows the sequence steps necessary to complete an analysis of a data series. When an uncertainty arises, a quick reference to the help screen refreshes the user's memory. Use of AUTOBOX 3.0 in many semesters of an undergraduate forecasting course provides the foundation for verifying its ease of use.

Impressions

AUTOBOX 3.0 is the cadillac of advanced time series programs. May this reviewer respectfully suggest that the reader ring the vendor and request a copy of the program. The free demo version contains all features including the data series, the automatic modeling, and advanced database management options. The demo version is available for the user's review and application for 60 days.

John C. Picket Department of Economics and Finance
University of Arkansas at Little Rock Little Rock
AR 72204, USA