BJIDENT

BJIDENT (IAC, NDIFF=*degree of differencing*,
NLAG=*number of autocorrelations to be computed*,
NLAGP=*number of partial autocorrelations to be computed*,
NSDIFF=*degree of seasonal differencing*,
NSPAN=*span of seasonal*, PACMETH=*partial autocorrelation method*,
PLOT, PLOTAC, PLTRAW, SILENT)
list of series ;

Function:

BJIDENT prints and plots descriptive statistics which are useful in **identifying** the process which generated a time series. The process of time series identification is described in the two references; TSP follows the notation of Box and Jenkins, who developed this technique for analyzing time series.

The decisions to be made in the process of identifying a time series process are 1) whether there is a seasonal component, 2) how much ordinary and seasonal differencing is required to make the series stationary, 3) and what are the minimum orders of the autoregressive and moving average polynomials required to explain adequately the time series. Subject to various option settings, BJIDENT will present plots of autocorrelations and partial autocorrelations for various levels of differencing of the input series.

Usage:

BJIDENT followed by the name of a series is the simplest form of the command. No differencing of the series will be done in this case, and the output will consist of a plot of the series, and a printout and plot of the autocorrelations of the first 20 lags of the series and the first 10 partial autocorrelations.

Autocorrelations are the correlation of the series with its own values lagged once, lagged twice, and so forth for 20 lags. Partial autocorrelations are the correlations measured with the series residual after all the prior lags have been removed. That is, the second partial autocorrelation is the correlation of the series lagged twice with the part of the series which is orthogonal to the first lag.

If you want to analyze the log or other transformation of your original series, as suggested by Box and Jenkins or Nelson, transform the series using a GENR statement before submitting it to BJIDENT.

Options:

IAC/**NOIAC** specifies whether the inverse autocorrelations are to be computed and printed.

NDIFF= the degree of differencing to be applied to the series. The default is zero (no differencing). BJIDENT will calculate statistics for all the differences of the series up to and including the NDIFFth order.

NLAG= the number of autocorrelations to be computed. The default is 20.

NLAGP= the number of partial autocorrelations to be computed. The default is 10.

NSDIFF= the degree of seasonal differencing to be applied to the series. The default is zero (no differencing). As in the case of ordinary differencing, BJIDENT will calculate statistics for all the differences of the series up to and including

the NSDIFFth order.

NSPAN= the span (number of periods) of the seasonal cycle, i.e., for quarterly data, NSPAN should be 4. The default is the current frequency (that is, 1 for annual, 4 for quarterly, 12 for monthly).

PACMETH=BURG or OLS or YULEWALK , the method for computing partial autocorrelations.

PLOT/NOPLOT specifies whether all the differenced series are to be plotted.

PLOTAC/NOPLOTAC specifies whether the autocorrelations and partial autocorrelations are to be plotted.

PLTRAW/**NOPLTRAW** specifies whether the original "raw" series is to be plotted.

SILENT/**NOSILENT** Turns off all output. Results are still stored in @AC, @PAC, etc.

For all the Box-Jenkins procedures (BJIDENT, BJEST, and BJFRCST), TSP remembers the options from the previous Box-Jenkins command, so that you only need to specify the ones you want to change.

Examples:

This example computes the auto sales example from Nelson's book:

```
BJIDENT (IAC,NDIFF=1,NSDIFF=1,NSPAN=12,NLAG=48,NLAGP=20) AUTOSALE ;
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Output:

The output of BJIDENT begins with the plots of the raw and differenced series (if the PLOT option was requested). Next a table of the autocorrelations is printed with their standard errors and the Ljung-Box portmanteau test, or modified Q-statistic. These modified Q-statistics are distributed independently as chi-squared random variables with degrees of freedom equal to the number of autocorrelations. The null hypothesis is that all the autocorrelations to that order are zero.

Following this table, the partial autocorrelations are printed for each series. If PLOTAC has been specified, BJIDENT then plots the autocorrelation and partial autocorrelation functions of the series and its differences with standard error bands. Finally, the inverse autocorrelations are printed if requested. The following matrices are stored:

@AC	NLAG*#diff	Autocorrelations
@PAC	NLAGP*#diff	Partial autocorrelations
@IAC	NLAGP*NLAGP	Inverse autocorrelations for levels

References:

Box, George P. and Gwilym M. Jenkins, **Time Series Analysis: Forecasting and Control,** Holden-Day, New York, 1976.

Ljung, G.M., and Box, George, "On a measure of lack of fit in time series models," **Biometrika 66**, 1978, pp. 297-303.

Nelson, Charles, **Applied Time Series Analysis for Managerial Forecasting,** Holden-Day, New York, 1973.

Pindyck, Robert S. and Daniel L. Rubinfeld, **Econometric Models and Economic Forecasts,** McGraw-Hill Book Co., 1976, Chapters 13 and 14.