Introduction to EViews

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http://augustus.csscr.washington.edu/pdf/eviews.pdf

WHAT IS EVIEWS?

EViews, which stands for Econometric Views, is a new version of a statistical package for manipulating time series data. It was originally the Time Series Processor (TSP) software for large mainframe computers. Although EViews was mostly formulated by economists, the program itself can also be used in other fields of study, such as sociology, statistics, finance, etc. EViews makes use of the user-friendly windows environment; most of its operations can be done with the drop-down menus. In general, EViews can perform the following jobs:

- Data Analysis and Evaluation
- Regression
- Forecasting
- Simulation

Starting EViews

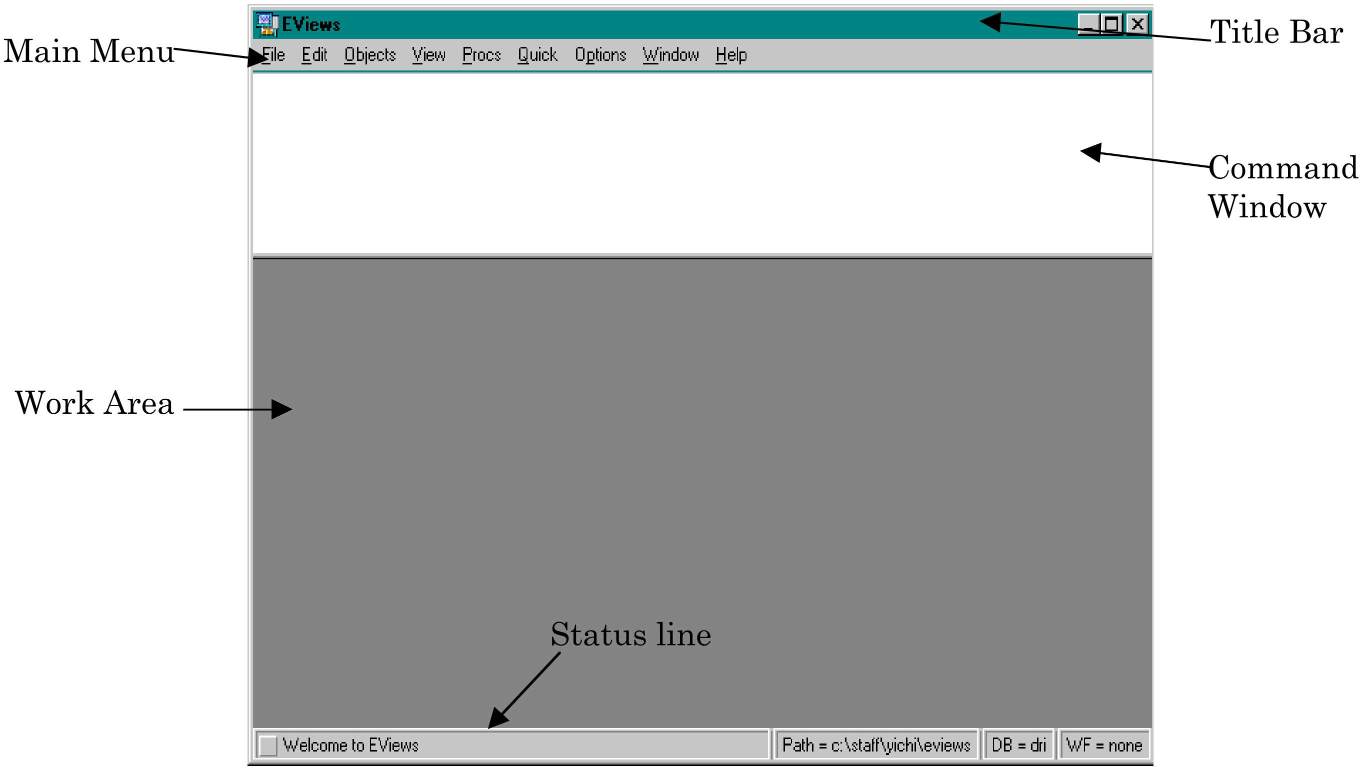
There are several ways to launch EViews on CSSCR's computers:

- Click on the **Start** button in the taskbar, then select **Programs,** followed by **EViews 3**, then select the **EViews 3.1** icon.
- Double click on the **EViews 3.1** icon
- Double click on an EViews workfile or database icon.

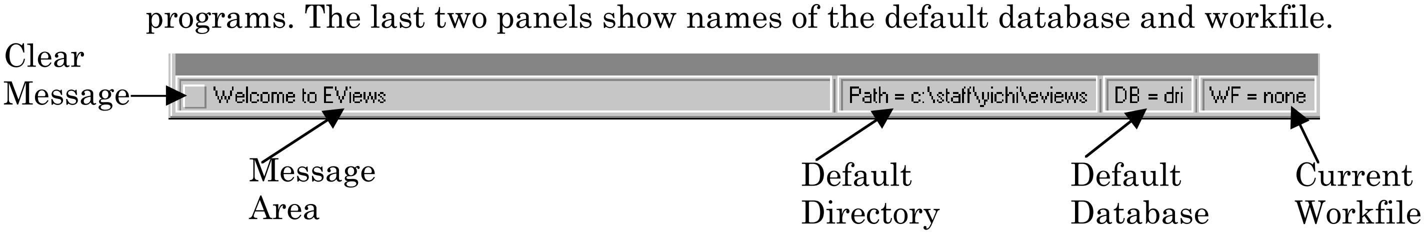
  Note: EViews at CSSCR is only available on the PCs.

The EViews Window

When you correctly launch the program, the EViews window should look like this:

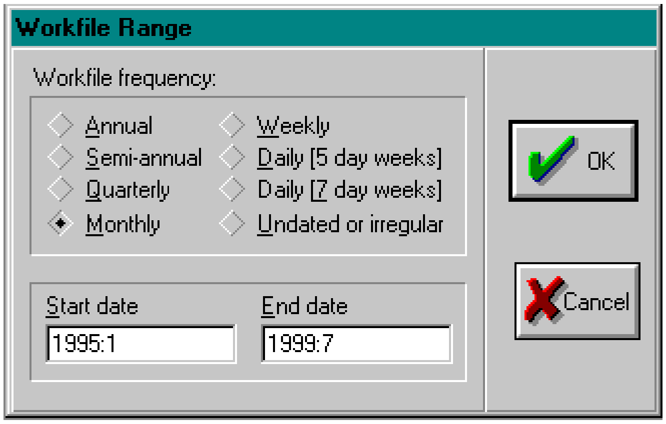


- **The Title Bar** is at the very top of the main window with, labeled EViews. When this bar is highlighted, EViews is the active program in Windows.
- **The Main Menu**: It is located right below the title bar. There are drop-down menus where you can find available functions of EViews for the current workfile. Click on a word in the drop-down menu and select the highlighted item.
- **The Command Window** is below the menu bar and displays as a white panel. You can type an EViews command in this window, then hit ENTER to execute the command.
- **The Work Area** is in the middle of the window where EViews will display the various object windows that it creates.
- **The Status Line**: At the very bottom of the window is a status line which is divided into several panels. The left panel will sometimes contain status messages from EViews; clear these messages by clicking on the box at the far left of the status line. The next section shows the default directory that EViews will search for data and programs. The last two panels show names of the default database and workfile.



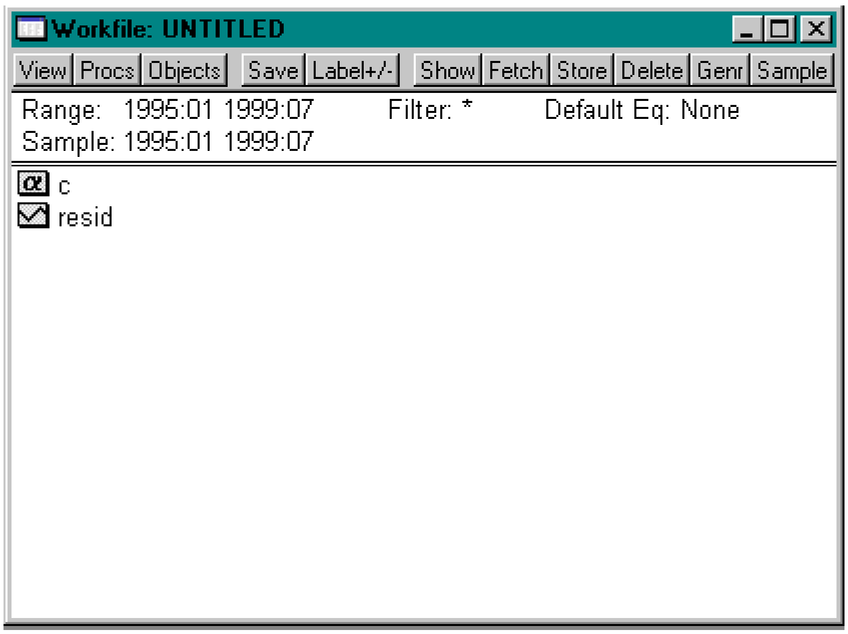
Creating a Workfile and Importing Data

The first step is to read data into an EViews workfile.



To create a workfile to hold your data, select **File/New/Workfile**..., to open a dialogue box where you will provide information about your data.

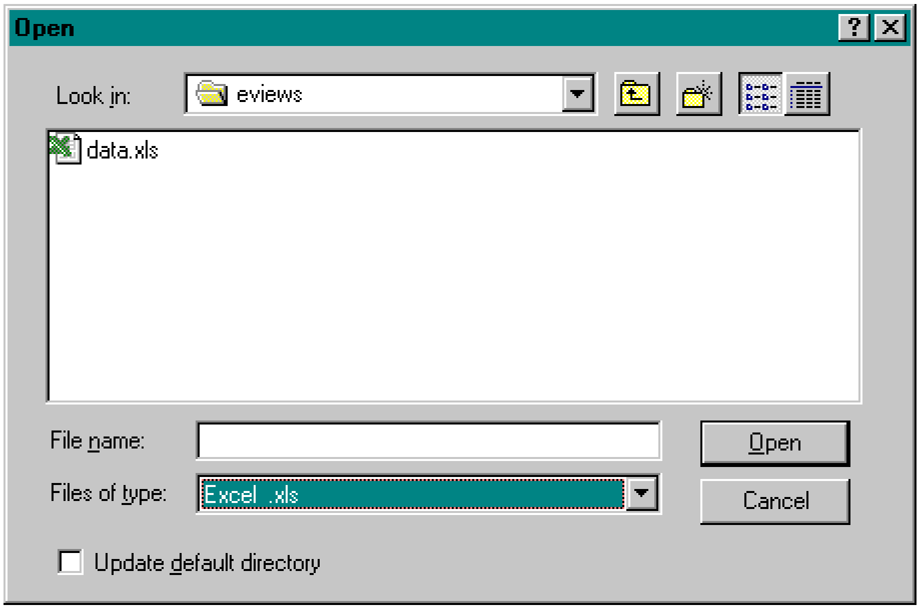
In this example, monthly data are observed from January of 1995 to July of 1999. You should set the workfile frequency to monthly, and specify the start date 1995:1, and the end date 1999:7.



When you have completed the range, click on the **OK** button. EViews will create an untitled workfile, and will display the workfile window.

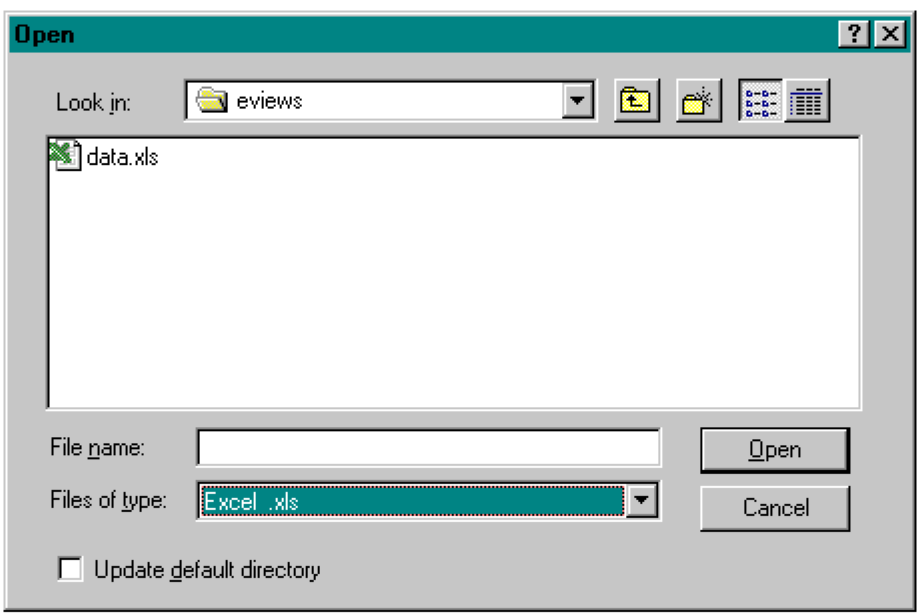
Notice that the workfile window displays two pairs of dates: one for the range of dates contained in the workfile, and the second for the current workfile. Note also that the workfile contains the coefficient vector C and the series RESID. All EViews workfiles will contain these two objects.

The next step is to import data into the workfile. The data for the three variables used in the analysis have been provided in an Excel file named DATA.XLS. The data in DATA.XLS are arranged with each of the three series in columns, with names in the first row, and dates in the first column. You can download this data file, DATA.XLS, from my Web site at: http://students.washington.edu/ycchen/eviews.htm

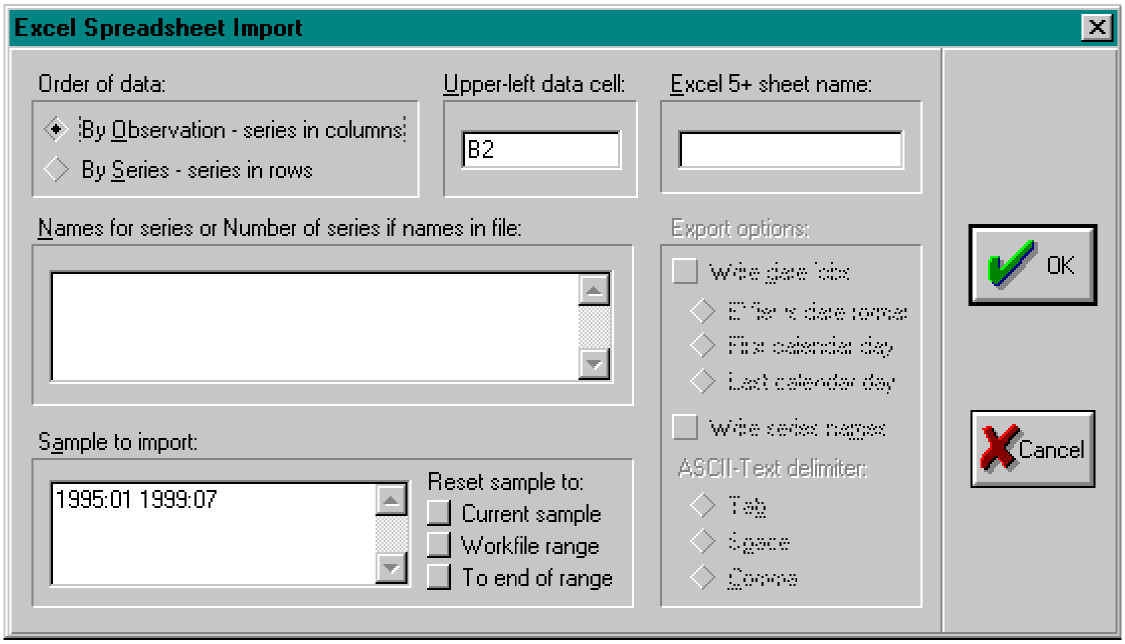


To read these data, click on Procs/Import/Read Text-Lotus-Excel....

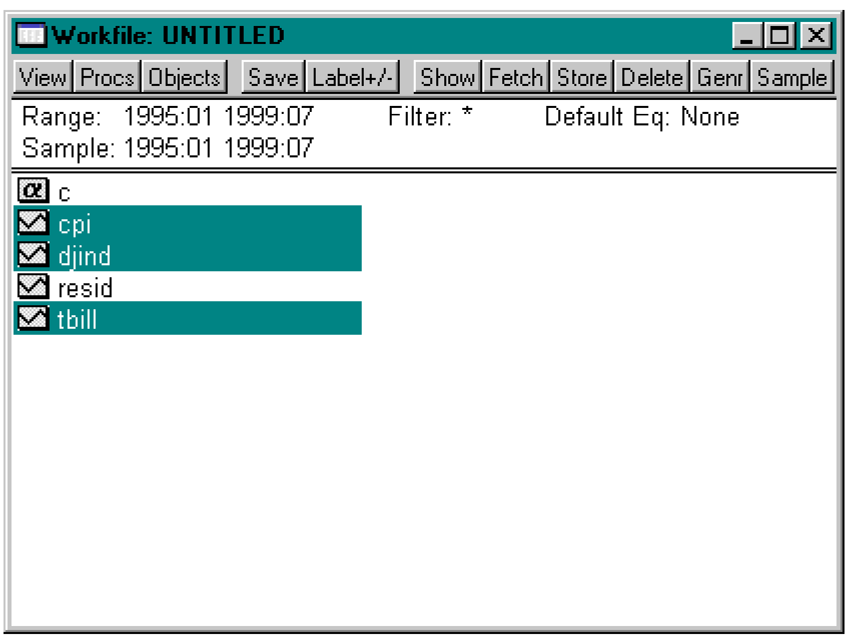
Locate the DATA.XLS file and double click on the file name. You can make finding your file a bit easier by choosing **Excel .xls** from the **Files of type** box.



EViews will open the Excel spreadsheet import dialogue box.



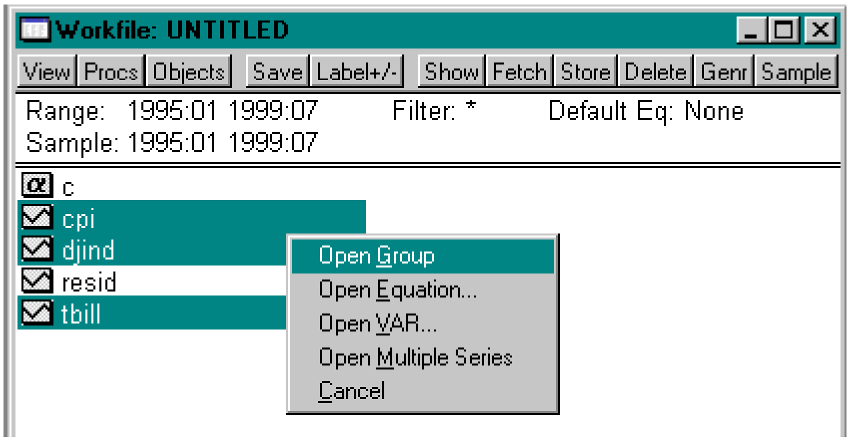
The default settings for order of data, upper-left data cell, and the sample to import should be appropriate for this Excel file. Since the names of the series are in the first row of the Excel file, you can enter the number of series, 3, in the **Names for series or Number of series if name in file** field of the dialog box. Click OK, and EViews will import the three series. These series will appear as icons in the workfile window.



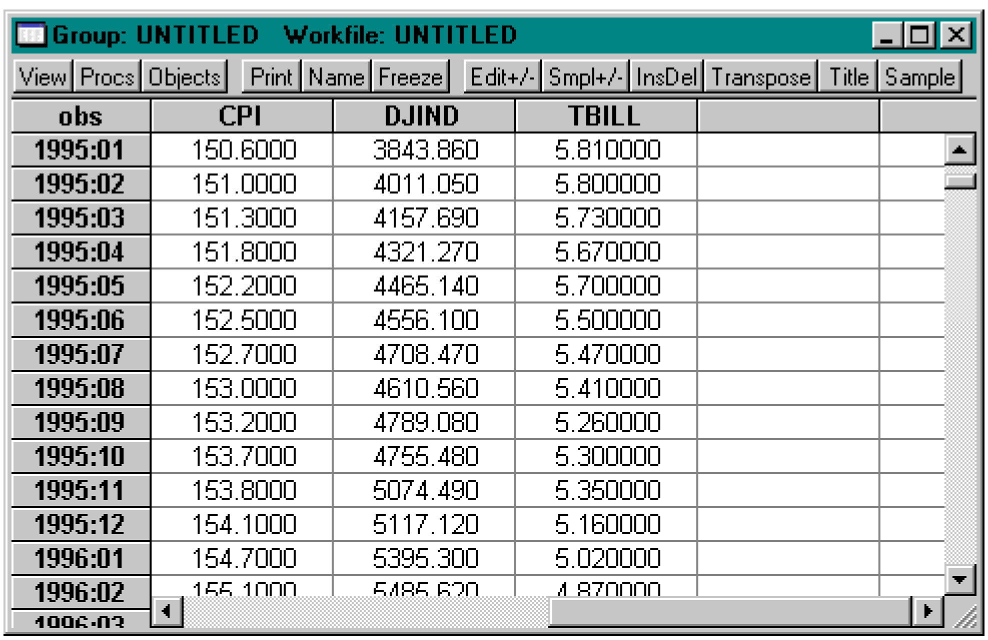
Verifying the Data

After importing, you should verify that the data have been read correctly. To create a group object that allows you to examine all three series, click on the name CPI in the workfile window, and then CTRL + click on DJIND and TBILL. All three of the series should be highlighted.

Now place the cursor anywhere in the highlighted area and double click the left mouse button. You'll see a popup menu with several options. Choose **Open Group**. EViews will create an untitled group object containing all three of the series.



The default window for the group shows a spreadsheet view of the series:



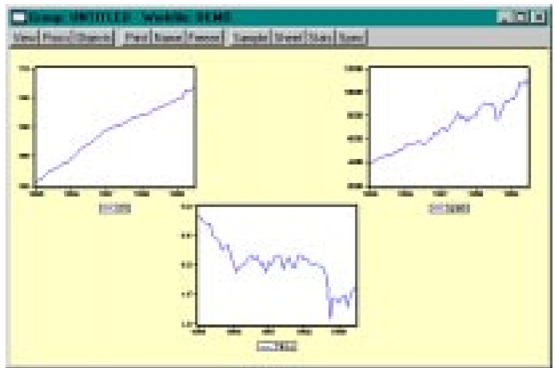
obs	CPI	DJIND	TBILL
1995:01	150.6000	3843.860	5.810000
1995:02	151.0000	4011.050	5.800000
1995:03	151.3000	4157.690	5.730000
1995:04	151.8000	4321.270	5.670000
1995:05	152.2000	4465.140	5.700000
1995:06	152.5000	4556.100	5.500000
1995:07	152.7000	4708.470	5.470000
1995:08	153.0000	4610.560	5.410000
1995:09	153.2000	4789.080	5.260000
1995:10	153.7000	4755.480	5.300000
1995:11	153.8000	5074.490	5.350000
1995:12	154.1000	5117.120	5.160000
1996:01	154.7000	5395.300	5.020000
1996:02	155.1000	5485.620	4.870000

Compare the spreadsheet view with the Excel worksheet to ensure that the first part of the data has been read correctly. Use the scroll bars/arrows to verify the rest of the data.

Once you are satisfied that the data are correct, you should save the workfile by clicking the **Save** button in the workfile window. A dialogue box will open, prompting you for a workfile name and location. Enter DEMO, then click **OK**. EViews will save the workfile in the specified directory with the name DEMO.WF1. A saved workfile can be opened later by selecting **File/Open/Workfile...** from the main menu.

Examining the Data

Use basic EViews tools to examine the data in a variety of ways. For example, if you select **View/Multiple Graphs/Line** from the group object toolbar, EViews displays line graphs.



You can move the graph by dragging it anywhere in the work area. If you want to change configurations of the graph, double click on the graph, it will prompt you with a window with the graph setup. Select **View/Descriptive Stats/Individual Samples** to compute descriptive statistics for each of the series,

Group: UNTITLED Workfile: DEMO

View | Procs | Objects | Print | Name | Freeze | Sample | Sheet | Stats | Spec

	CPI	DJIND	TBILL
Mean	159.2327	7050.391	5.024909
Median	160.1000	7008.990	5.030000
Maximum	166.7000	10970.80	5.810000
Minimum	150.6000	3843.860	4.080000
Std. Dev.	4.627897	1964.618	0.375681
Skewness	-0.275537	0.187762	-0.163218
Kurtosis	1.912520	1.988315	3.241903
Jarque-Bera	3.406093	2.668703	0.378303
Probability	0.182128	0.263329	0.827661
Observations	55	55	55

or click on **View/Correlations** to display the correlation matrix of the three series.

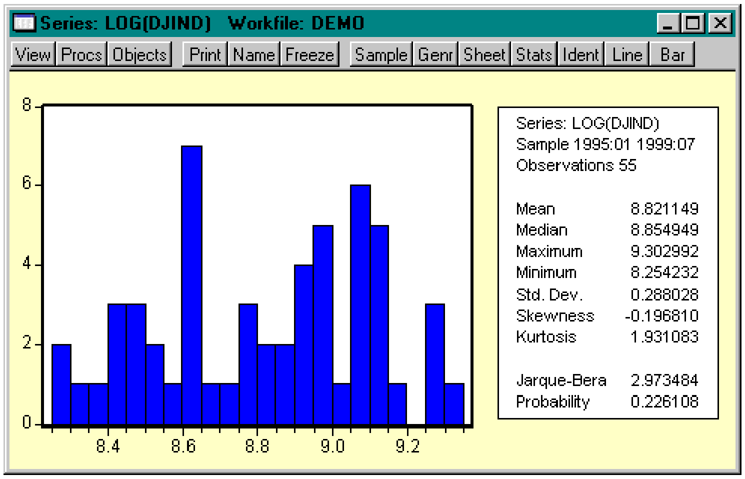
Group: UNTITLED Workfile: DEMO

View | Procs | Objects | Print | Name | Freeze | Sample | Sheet | Stats | Spec

Correlation Matrix

	CPI	DJIND	TBILL
CPI	1.000000	0.971277	-0.832802
DJIND	0.971277	1.000000	-0.803512
TBILL	-0.832802	-0.803512	1.000000

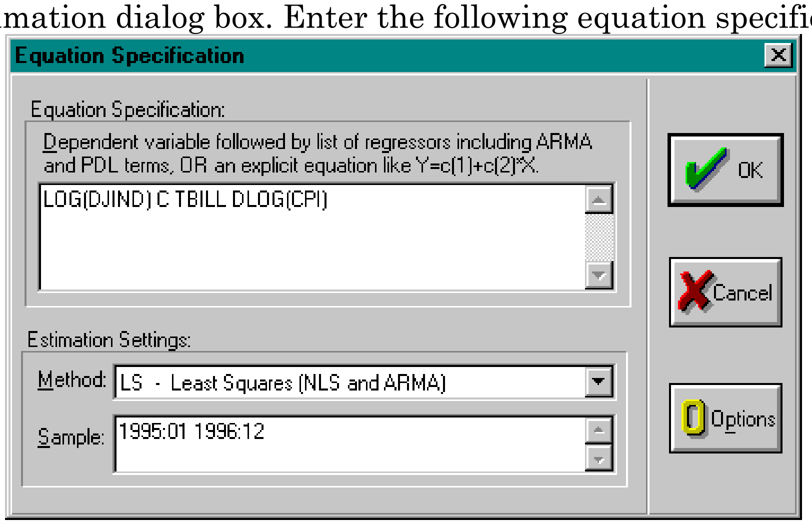
You can also examine characteristics of the individual series. The regression analysis below will be expressed in logarithms, so you will work the log of DJIND. Select **Quick/Show…** , enter `log(djind)`, and click OK for a series window for LOG(DJIND).



Estimating a Regression Model

Now estimate a regression model for DJIND using data over the period from 1995:1 to 1996:12 and use this estimated regression to construct forecasts over the period 1999:1 to 1999:7. The model specification is: $\log(DJIND_t) = \beta_1 + \beta_2 TBILL_t + \beta_3 \Delta \log(CPI_t) + \varepsilon_t$ where log(DJIND) is the logarithm of the Dow-Jones Industrial Averages, TBILL is the Treasury Bill Rate, and Δlog(CPI) is the log first difference of the price level (the approximate rate of inflation).

To estimate the model, create an equation object. Go to **Quick/Estimate Equation…** to open the estimation dialog box. Enter the following equation specification.



Now list the name of the dependent variable, followed by the name of each of the regressors, separated by a space. We use expressions with the terms `log` and `dlog` to represent the log transformation of DJIND and the difference of the log transformation for CPI. The built-in series name C stands for the constant in the regression. The default is set to estimate the equation using the **LS - Least Squares** method for the **Sample** 1995:1 1996:12. Change the **Sample** to any other period to estimate the equation for the subsample of observations.

Click **OK** to estimate the equation using least squares and to display the regression results.

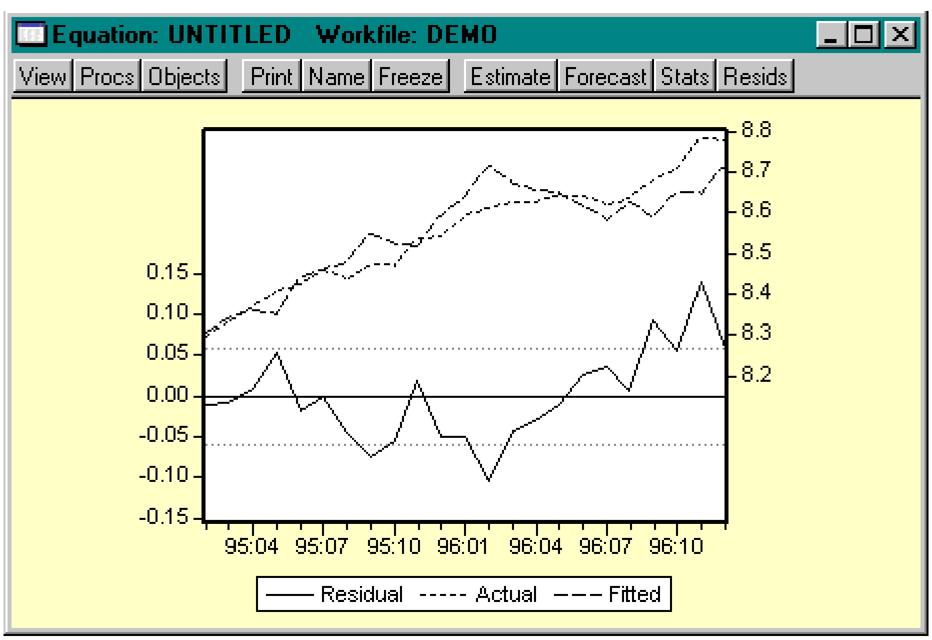
Dependent Variable: LOG(DJIND)
Method: Least Squares
Date: 09/08/99 Time: 10:45
Sample(adjusted): 1995:02 1996:12
Included observations: 23 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	10.84783	0.243091	44.62453	0.0000
TBILL	-0.435942	0.044697	-9.753271	0.0000
DLOG(CPI)	-4.512263	13.87453	-0.325219	0.7484

R-squared	0.829656	Mean dependent var	8.550448
Adjusted R-squared	0.812622	S.D. dependent var	0.135459
S.E. of regression	0.058636	Akaike info criterion	-2.713815
Sum squared resid	0.068765	Schwarz criterion	-2.565707
Log likelihood	34.20887	F-statistic	48.70480
Durbin-Watson stat	0.760911	Prob(F-statistic)	0.000000

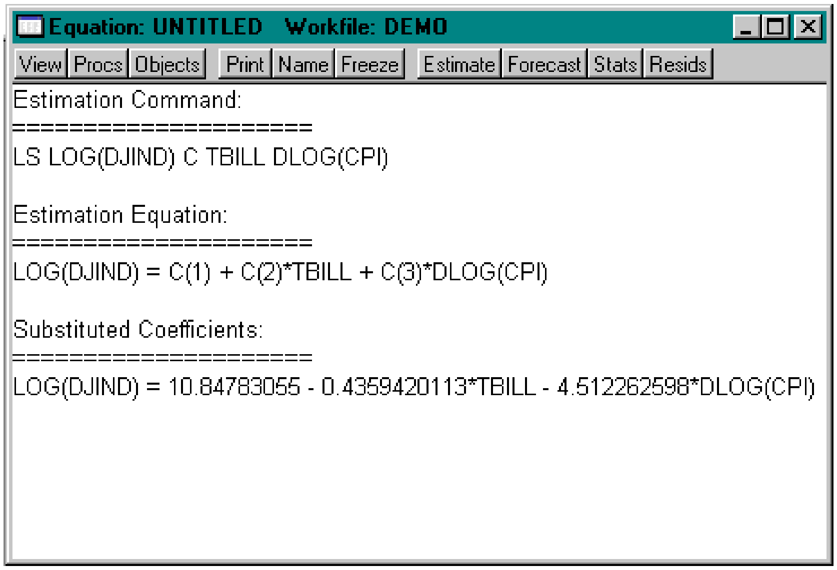
Note that the equation is estimated from 1995:2 to 1996:12 since one observation is dropped to account for the `dlog` difference term. The estimated coefficients are statistically significant under a 5% level of significance except for the price term. The overall regression fit, as measured by the R^2 statistic, indicates a moderate fit.

You can select **View/Actual, Fitted, Residual/Graph** in the equation toolbar to display a graph of the actual and fitted values for the dependent variable, along with the residuals.

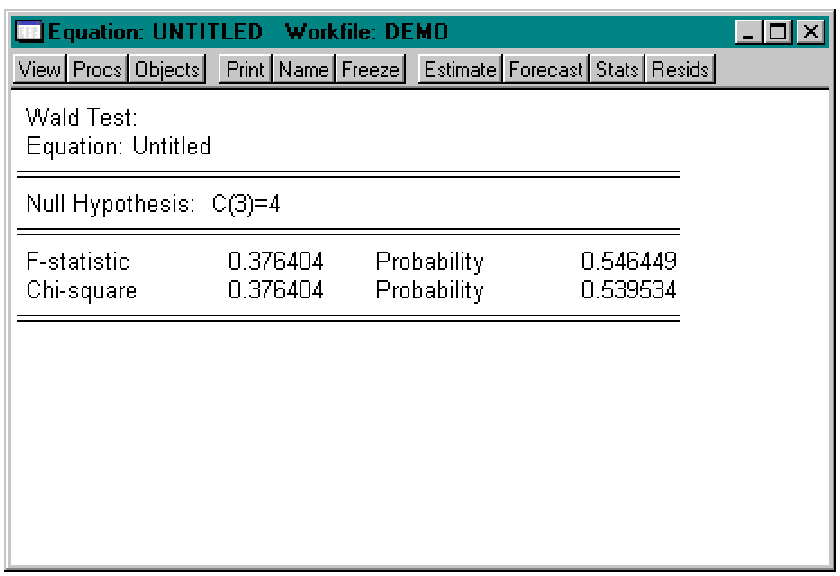


Specification and Hypothesis Tests

Use the estimated equation to perform hypothesis tests on the coefficients of the model. To test the hypothesis that the coefficient on the CPI is equal to 4, perform a Wald test. First, find the coefficient of interest by choosing **View/Representations** from the equation toolbar.



Note that the coefficients are assigned in the order that the variables appear in the specification so that the coefficient for the CPI is labeled C(3). To test the restriction on C(3) you should select **View/Coefficient Tests/Wald-Coefficient Restrictions...**, and enter the restriction `c(3)=4`. EViews will report the results of the Wald test.



The high probability values indicate the null hypothesis that C(3) = 4 cannot be rejected.

You should, however, be somewhat cautious of accepting this result without additional analysis. The low value of the Durbin-Watson statistic reported above is indicative of the presence of serial correlation in the residuals of the estimated equation. If uncorrected, serial correlation in the residuals will lead to incorrect estimates of the standard errors, and invalid statistical inference for the coefficients of the equation.

The Durbin-Watson statistic can be difficult to interpret. To perform a more general Breusch-Godfrey test for serial correlation in the residuals, select **View/Residual Tests/Serial Correlation LM Test...** from the equation toolbar, and specify an order of serial correlation to test against. Entering 1 yields a test against first-order serial correlation.

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	11.60113	Probability	0.002964
Obs*R-squared	8.719483	Probability	0.003148

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 09/08/99 Time: 10:56
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.065886	0.197474	-0.333643	0.7423
TBILL	0.010782	0.036273	0.297244	0.7695
DLOG(CPI)	4.584691	11.29716	0.405827	0.6894
RESID(-1)	0.638061	0.187332	3.406044	0.0030

R-squared	0.379108	Mean dependent var	-1.99E-15
Adjusted R-squared	0.281072	S.D. dependent var	0.055908
S.E. of regression	0.047404	Akaike info criterion	-3.103456
Sum squared resid	0.042695	Schwarz criterion	-2.905979
Log likelihood	39.68974	F-statistic	3.867044
Durbin-Watson stat	2.314207	Prob(F-statistic)	0.025801

The top part of the output presents the test statistics and associated probability values. The test regression used is reported below the statistics.

The statistic labeled "Obs*R-squared" is the LM test statistic for the null hypothesis of no serial correlation. The low probability values indicate the presence of serial correlation in the residuals.

Modifying the Equation

The test results suggest that we need to modify our original specification to take account of the serial correlation.

One approach is to include lags of the independent variables. To add variables to the existing equation, click on the **Estimate** button in the equation toolbar and edit the specification to include lags for each of the original explanatory variables:

```
log(djind) c tbill dlog(cpi) log(djind(-1)) tbill(-1) dlog(cpi(-1))
```

Note that lags are specified by including a negative number, enclosed in parentheses, following the series name. Click on **OK** to estimate the new specification and to display the results.

Dependent Variable: LOG(DJIND)
Method: Least Squares
Date: 09/08/99 Time: 11:00
Sample(adjusted): 1995:03 1996:12
Included observations: 22 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.500366	1.358865	0.368223	0.7175
TBILL	0.006630	0.074754	0.088692	0.9304
DLOG(CPI)	-0.496099	6.918686	-0.071704	0.9437
LOG(DJIND(-1))	0.943682	0.123421	7.646040	0.0000
TBILL(-1)	-0.009306	0.069376	-0.134143	0.8950
DLOG(CPI(-1))	7.447417	6.799159	1.095344	0.2896

R-squared	0.961404	Mean dependent var	8.561977
Adjusted R-squared	0.949343	S.D. dependent var	0.126571
S.E. of regression	0.028487	Akaike info criterion	-4.051702
Sum squared resid	0.012985	Schwarz criterion	-3.754145
Log likelihood	50.56872	F-statistic	79.71014
Durbin-Watson stat	2.248278	Prob(F-statistic)	0.000000

Note that EViews has automatically adjusted the estimation sample to accommodate the additional lagged variables. We can save this equation in the workfile by pressing the **Name** button in the toolbar and name the equation EQ_LAG.

Another common method of accounting for serial correlation is to include autoregressive (AR) and/or moving average (MA) terms in the equation. To estimate the model with an AR(1) error specification, you should make a copy of the previous equation by clicking **Objects/Copy Object...**. EViews will create a new untitled equation containing all of the information from the previous equation.

Press **Estimate** on the toolbar of the copy and modify the specification to

```
log(djind) c tbill dlog(cpi) ar(1)
```

This specification removes the lagged terms, replacing them with an AR(1) specification. Click **OK**. EViews will report the estimation results, including the estimated first-order autoregressive coefficient of the error terms.

The fit of the AR(1) model is roughly comparable to the lag model, but the somewhat lower values for both the Akaike and the Schwartz information criteria indicate that the AR(1) model should be preferred. We will use the AR(1) model for the reminder of the demonstration.

Dependent Variable: LOG(DJIND)
Method: Least Squares
Date: 09/08/99 Time: 11:02
Sample(adjusted): 1995:03 1996:12
Included observations: 22 after adjusting endpoints
Convergence achieved after 8 iterations

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9.024322	0.658117	13.71233	0.0000
TBILL	0.010918	0.063698	0.171407	0.8658
DLOG(CPI)	-4.025946	4.505746	-0.893514	0.3834
AR(1)	0.958599	0.044865	21.36635	0.0000

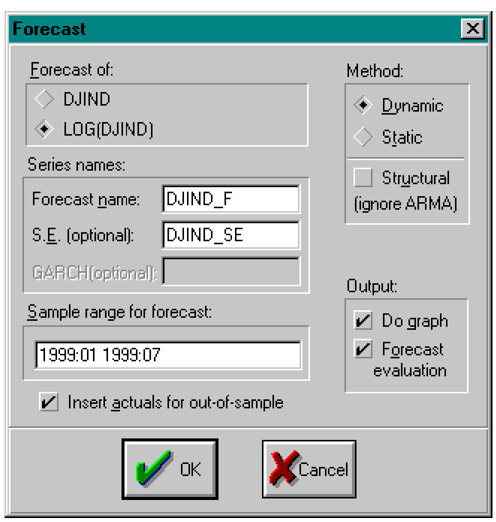
R-squared	0.960097	Mean dependent var	8.561977
Adjusted R-squared	0.953447	S.D. dependent var	0.126571
S.E. of regression	0.027309	Akaike info criterion	-4.200227
Sum squared resid	0.013424	Schwarz criterion	-4.001855
Log likelihood	50.20249	F-statistic	144.3661
Durbin-Watson stat	2.182596	Prob(F-statistic)	0.000000

Inverted AR Roots .96

Forecasting from an Estimated Equation

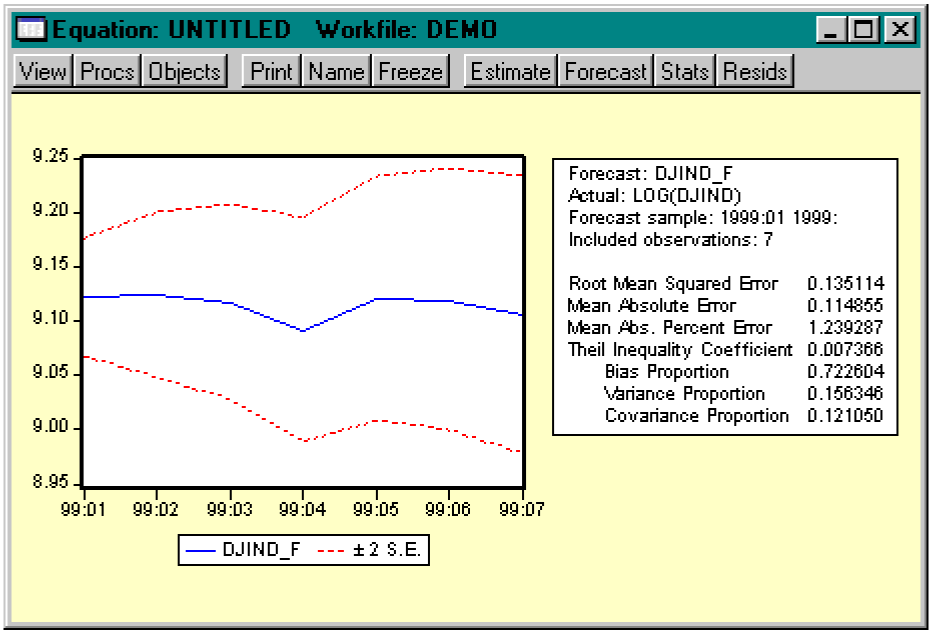
We have estimated the equation for a subset of our data, so that we may compare forecasts based upon this model with the actual data for the post-estimation sample 1999:1 - 1999:7.

Click on the **Forecast** button in the AR(1) equation toolbar to open the forecast window.



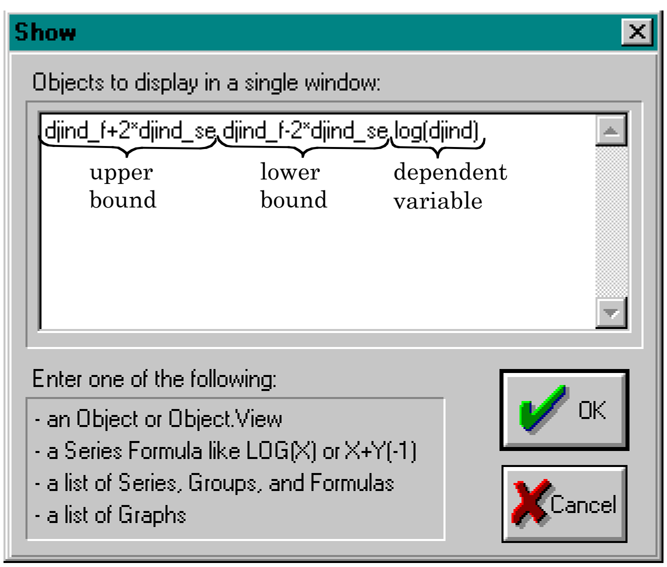
Set the forecast sample to 1999:01 - 1999:7 and provide names for both the forecasts and forecast standard errors so both will be saved as series in the workfile. The forecasted values will be saved in DJIND_F and the forecast standard errors will be saved in DJIND_SE.

Notice that we have selected to forecast the log of DJIND, not the level, and that we request both graphical and forecast evaluation output. The dynamic option constructs the forecast for the sample period using only information available at the beginning of 1999:1. When you click **OK**, EViews displays both a graph of the forecasts, and statistics evaluation the equality of the fit to the actual data.



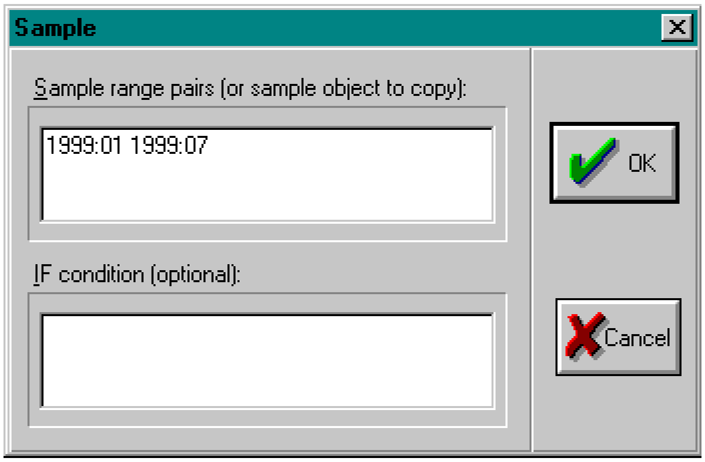
You can also plot the actual values of LOG(DJIND) against the forecasted values and the (approximate) 95% confidence intervals for forecasts. Create a new group containing these values by going to **Quick/Show…** and type in the following expression:

djind_f+2*djind_se djind_f-2*djind_se log(djind)

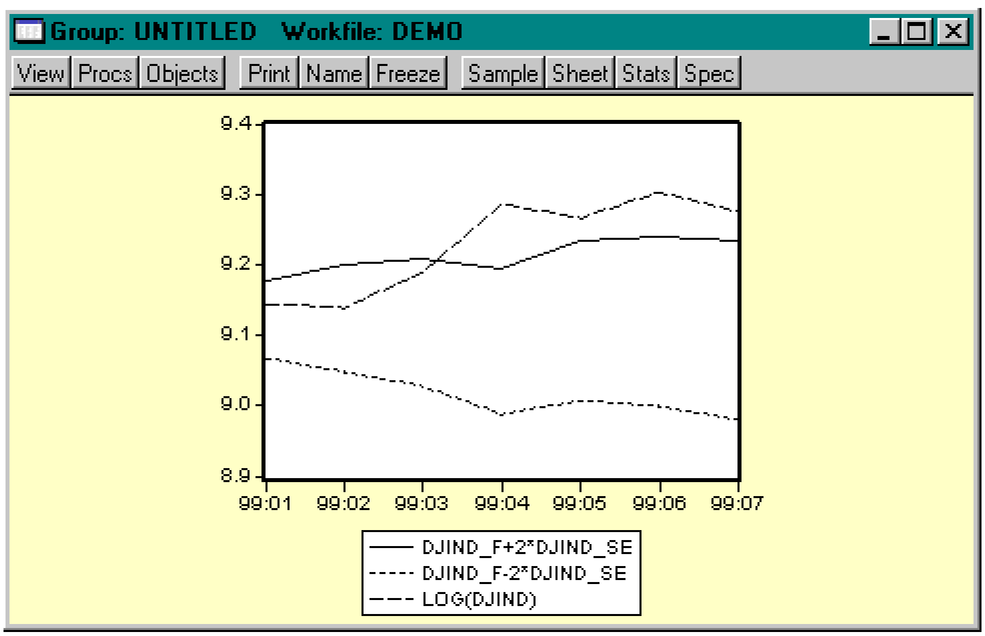


There are three parts to the expression. The first two represent the upper and lower bounds of the 95% forecast interval as computed by evaluating the values of the point forecasts plus and minus two times the standard errors. The last part is the dependent variable.

When you click **OK**, EViews opens an untitled group window containing a spreadsheet view of the data. Before plotting the data, we will change the sample of observations so that we only plot data for the forecast sample. Select **Quick/Sample...** or click on the **Sample** button in the group toolbar, and change the sample to include only the forecast period.



To plot the data for the forecast period, select **View/Graph/Line** from the group window.



The actual values of LOG(DJIND) are partly within the forecast interval for the first half of the forecast period, and fall below the upper bound of the 95% confidence interval beginning in 1999:3.

9/99, Yi-Chi Chen