Econometrics
220:322

Introduction to Econometric Computing with EViews[1]

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[1]These notes are written for EViews 3.1

1.0 What Is EViews?[2]

EViews provides sophisticated data analysis, regression, and forecasting tools on Windows-based computers. With EViews you can quickly develop a statistical relation from your data and then use the relation to forecast future values of the data. Areas where EViews can be useful include: scientific data analysis and evaluation, financial analysis, macroeconomic forecasting, simulation, sales forecasting, and cost analysis.
EViews is a new version of a set of tools for manipulating time series data originally developed in the Time Series Processor software for large computers. The immediate predecessor of EViews was MicroTSP, first released in 1981. Though EViews was developed by economists and most of its uses are in economics, there is nothing in its design that limits its usefulness to economic time series. Even quite large cross-section projects can be handled in EViews.

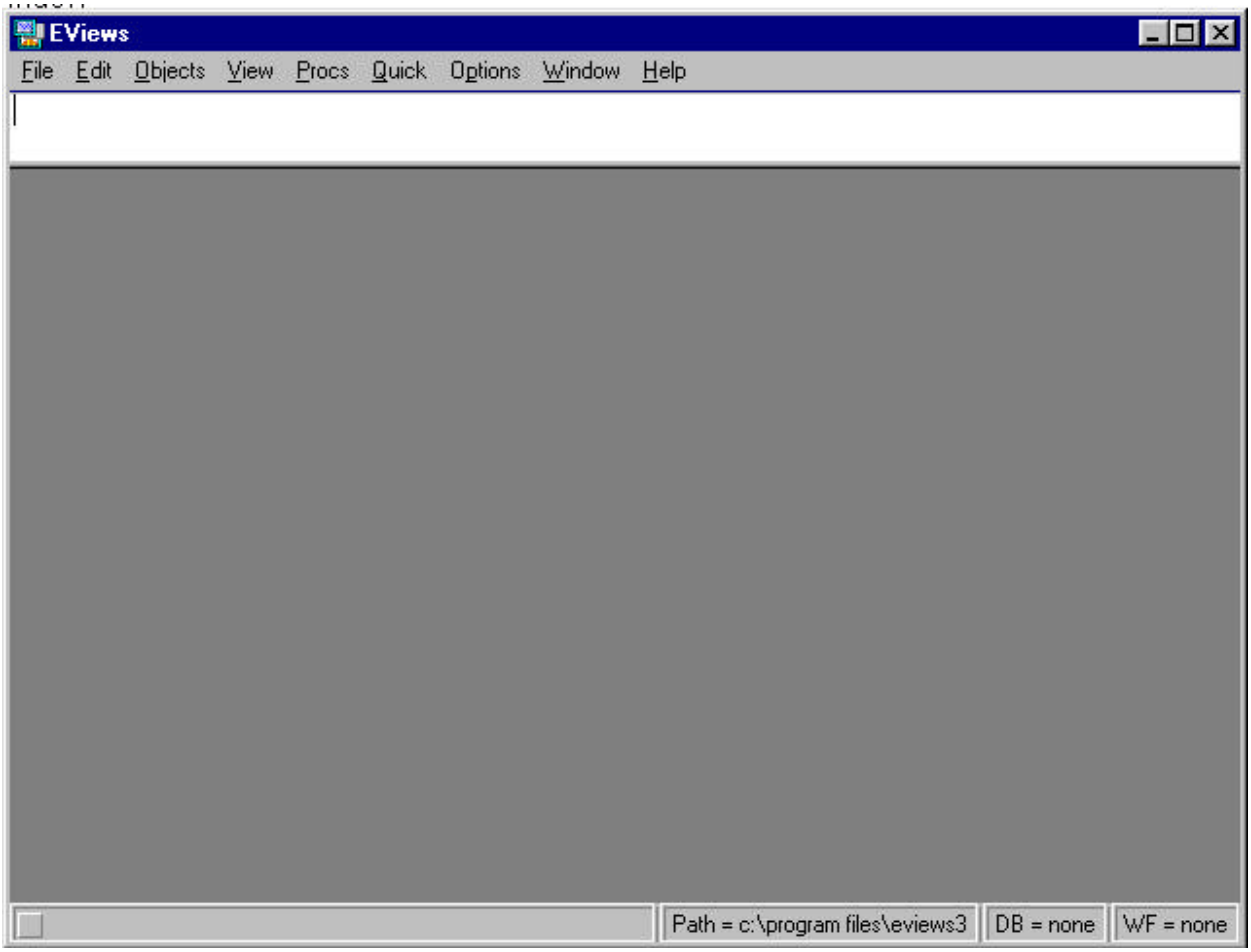
EViews provides convenient visual ways to enter data series from the keyboard or from disk files, to create new series from existing ones, to display and print series, and to carry out statistical analysis of the relationships among series.

EViews takes advantage of the visual features of modern Windows software. You can use your mouse to guide the operation with standard Windows menus and dialogs. Results appear in windows and can be manipulated with standard Windows techniques. Alternatively, you may use EViews' powerful command and batch processing language. You can enter and edit commands in the command window. You can also create and store the commands in programs that document your research project for later execution.

[2]This page is excerpted from the EViews help file:"Introduction to EViews"

2.0 Starting EViews

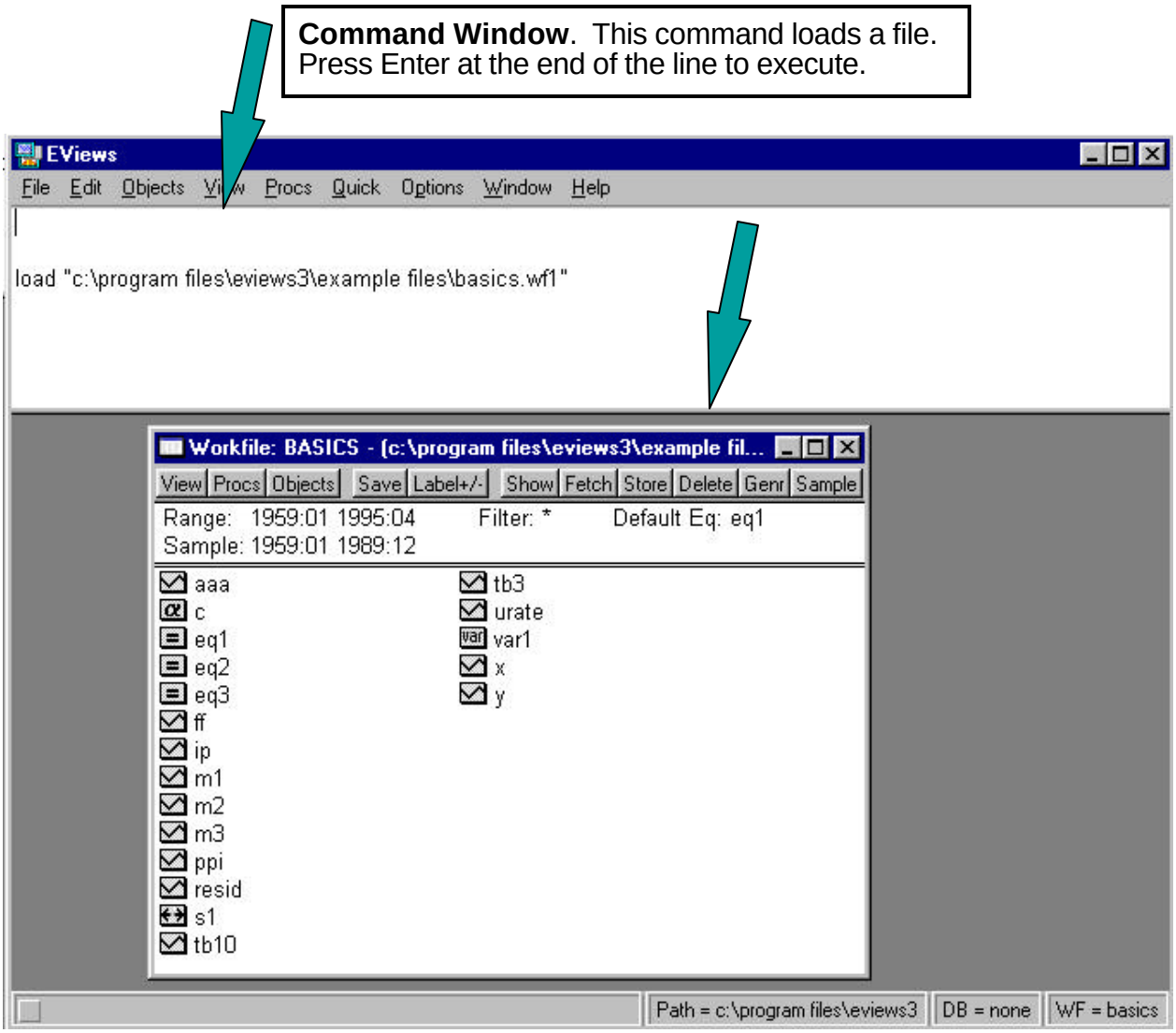
Once EViews is started, you should see a screen similar to



See the EViews HELP for more on this window.

2.1 The Initial Screen

When you are using EViews, you can tell it what to do by typing simple commands, by using menus, or by running program files. The following discussions will focus on the commands and menus. Program files are just collections of commands.

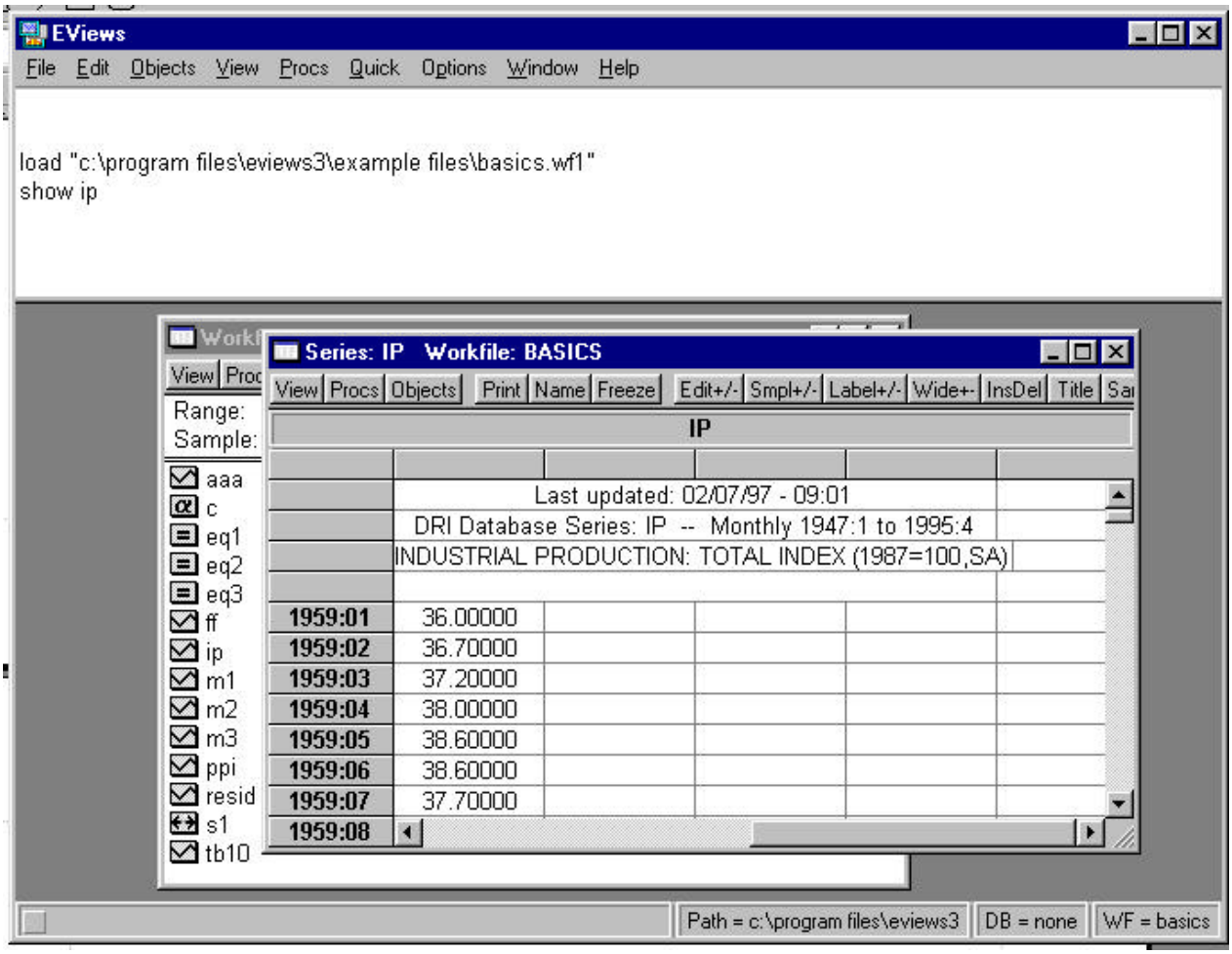


After loading a workfile, the pop-up screen tells you some information about the data. Don't worry about what everything means as yet. Just notice that the **range** for the data is 1950:01 - 1994:04 (January 1950 to April 1995) and the current sample, labeled SMPL, is set for 1950:01 - 1989:12. ***SMPL*** is EViews' abbreviation for "sample". The SMPL can be changed so that you can work on different time periods or observations. The data range is set for the entire dataset. Most likely when you first get into Eviews, the fields above will be blank.

See the HELP file for more on the Command Window.

2.2 Viewing Data

To view a series, enter the key word **SHOW** in the command area followed by the series name.



See the EViews help file (EViews Basics: Demonstration) for more information.

2.3 Using a Command File

I recommend entering commands in a command file and then "running" that file from EViews. The advantage of doing this is that if you have a long series of commands and something happens to the computer, your work will not be lost. In addition, you can create programs for later use.

Create a command file in any text editor such as NotePad. Just enter the commands as you would in the command window described above and save the file as a text file with extension *prg*. For example, you could create a simple file that contains the two lines

```
load "c:\program files\eviews3\example files\basics.wf1"
show ip
```

Note the use of double quotes in the first line. Using the File/Run option from the main menu, you would enter the program file path and name under the label *Program Name or Path*. Clicking OK will execute the commands.

See the EViews' help under Command and Programming: Program Basics for more detail and other ways to run a program.

2.4 Work Files

The work file is held in the computer's RAM memory during a session and contains all the data entered or created during a session. You have several options to start a new work file. In either case, you must tell EViews what kind of data you will be using. All data are either time series or cross-sectional data. Time series have a frequency of Annual, Semi-Annual, Quarterly, Monthly, or Daily. Cross-sectional data are undated. Each series, once created, is stored as a single variable with a series name.

2.4.1 Using the Menu System

You can create a new data series using the FILE/NEW/WORKFILE option from the main menu. EViews will ask for the frequency of the data and the earliest and latest dates you will be using in the session. For the first assignment, the data are annual for 1979 to 1988. The first date can be entered as 1978 or just as 78. An untitled workfile will appear as in the figure below. This workfile will have two objects: C and RESID. They appear automatically and will be explained later.

See below for how to actually enter the data.

2.4.2 Using a Command Line Entry

If you use the command line to create the workfile, enter

```
create A 79 88
```

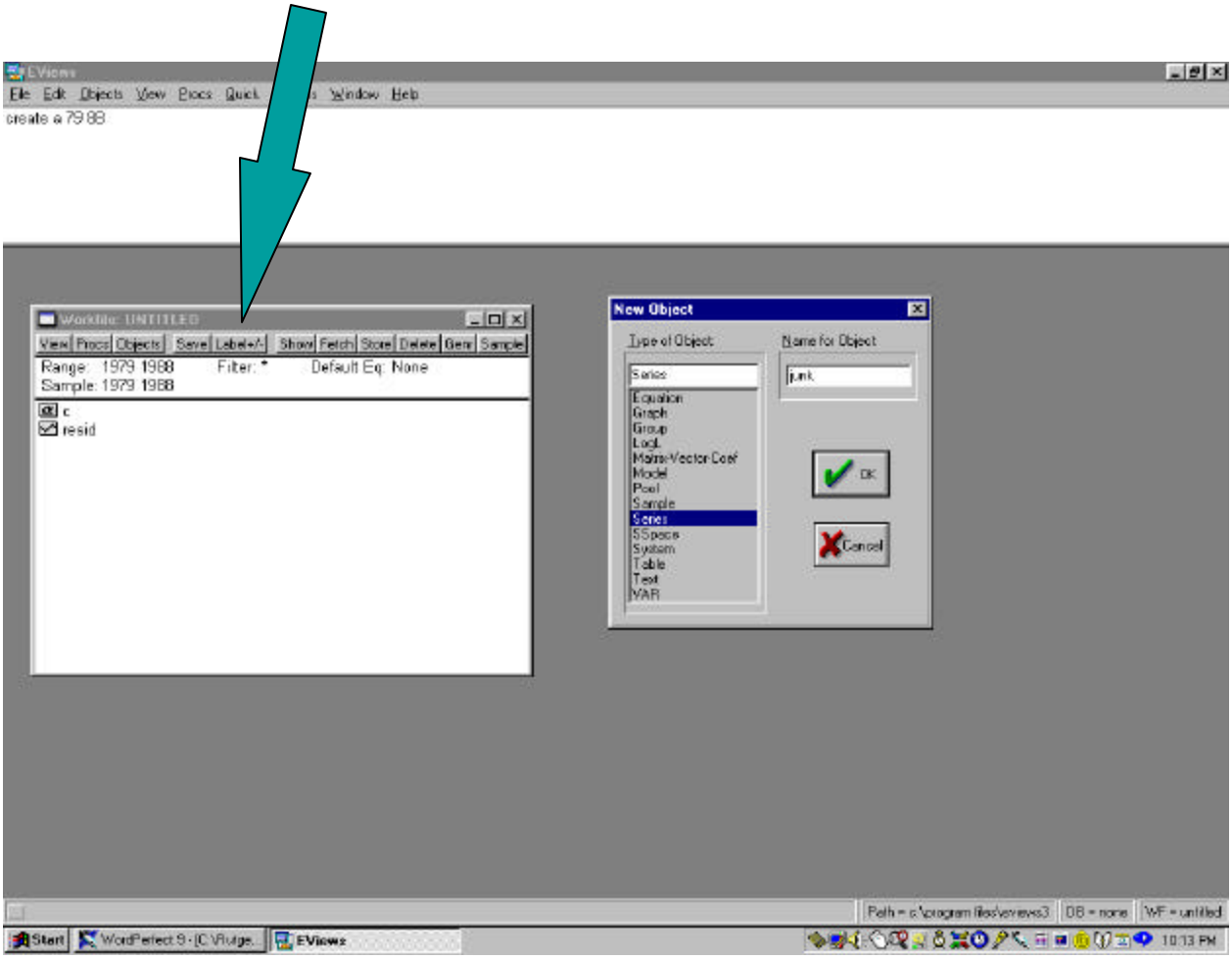
in the Command Window and press ENTER.

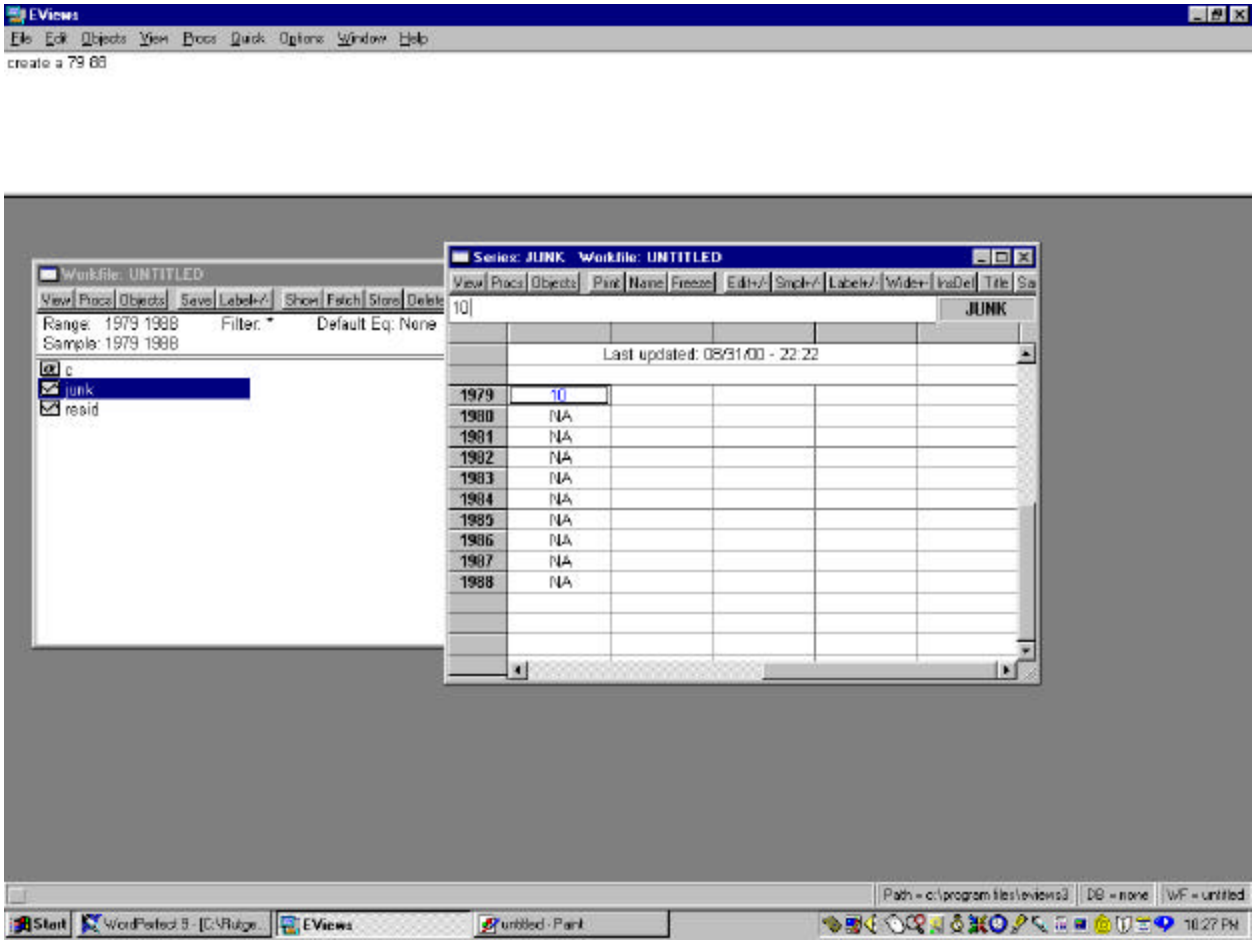
2.4.3 Entering Data

Once the workfile is specified, select OBJECT from the workfile menu bar and SERIES from the New Object dialog box. Enter a name in the space provided. Click OK. The name you entered will appear in the workfile list.

At this point, you just have a name for a series that will be annual data from 1979 to 1988, but no data; the series is empty. To enter data (or edit the data later), double click the

series name. A spreadsheet form will appear as shown below. Click EDIT+/- to toggle data entry. Enter data as you would expect, say, using a spreadsheet. Click EDIT+/- to save it. Select FILE/SAVE from the main menu to save the workfile.




EViews
File Edit Objects View Procs Quick Options Window Help
create a 79 88
Workfile: UNTITLED
View Procs Objects Save Label+/- Show Fetch Store Delete
Range: 1979 1988 Filter: * Default Eq: None
Sample: 1979 1988
c
junk
resid
Series: JUNK Workfile: UNTITLED
View Procs Objects Print Name Freeze Edit+/- Smpl+/- Label+/- Wide+ InsDel Title Sa
10
JUNK
Last updated: 08/31/00 - 22:22
1979 10
1980 NA
1981 NA
1982 NA
1983 NA
1984 NA
1985 NA
1986 NA
1987 NA
1988 NA
Path = c:\program files\eviews3 DB = none WF = untitled
Start WordPerfect 8 - [C:\Rutge... EViews untitled - Paint 10:27 PM

2.4.4 Viewing Data

You can either type **SHOW *seriesname*** in the Command Window or double click the series name in the workfile display. The command line entry version is shown in the next display.

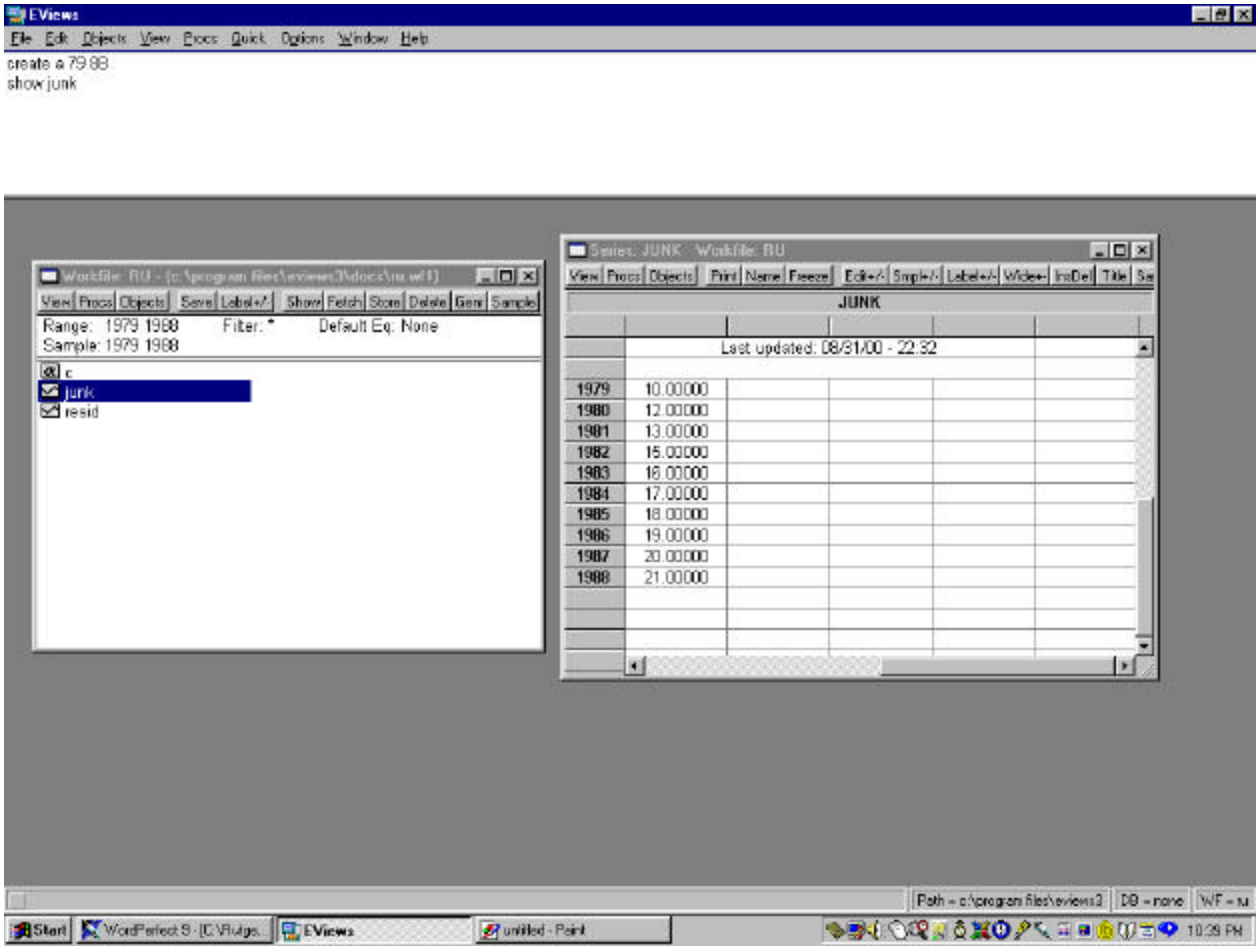
To view more than one series, select several at once by clicking on them (using the Ctrl key) and then selecting **OPEN GROUP**. The selected series will now be visible.

2.4.5 Graphs and Statistics

You can now create graphs or view summary statistics by once the series are displayed by clicking **VIEW** button and making an appropriate choice.

2.4.6 Importing Data

An effective way to manage your data is to use Excel. Excel will allow you to use a familiar interface plus give you some added capabilities, especially for small datasets. I recommend you use Excel. See the EViews' help topics for importing from a spreadsheet as well as other sources.



3.0 Specifics

3.1 Frequency Specification

See the HELP file for details on dates and CREATE.

Some Frequency Specifications	
If your data are	**You enter at the CREATE prompt**
Undated (e.g., cross-sectional data)	the number of observations you will enter
Annual	A 70 80 or A 1970 1980
Quarterly	Q 70.1 80.4 or Q 1970.1 1980.4 where the number after the dot is the quarter
Monthly	M 70.01 80.12 or M 1970.01 1980.12 where the number after the dot is the month

3.2 Rules for Naming a Series

1. Every name must begin with a letter.
2. Subsequent characters may be letters or digits.
3. Maximum of 8 characters.
4. Do not use the following reserved names:

   ABS, ACOS, AR, ASIN, C, CON, CNORM, COEF, COS, D, DLOG, DNORM, ELSE, ENDIF, EXP, LOG, LOGIT, LPT1, LPT2, MA, NA, NRND, PDL, RESID, RND, SAR, SIN, SMA, SQR, and THEN.

EViews accepts both capital letters and lower case letters in the names you give to your series and other objects, but it treats names as all capital letters, even if entered in lower case. Its messages to you will follow normal capitalization rules. For example, ‘SALES’, ‘sales’, and ‘sAles’ are all the same object in EViews. For the sake of uniformity, we have written all examples of input using names in lower case, but you should feel free to use capital letters instead.

3.3 Rules for Composing Commands

1. All commands begin with a command name. You may use either upper or lower case (many examples below are in both cases).

2. If a command permits an option, the option is in parentheses just after the name, without any blanks. Example: BAR(A). Options inside parentheses must be separated by commas. There must be a blank after the right parenthesis.

3. Series and file names following the command name must be separated by blanks, not commas. Example: LS(H) C Income GDP.

3.4 Generating a New Series

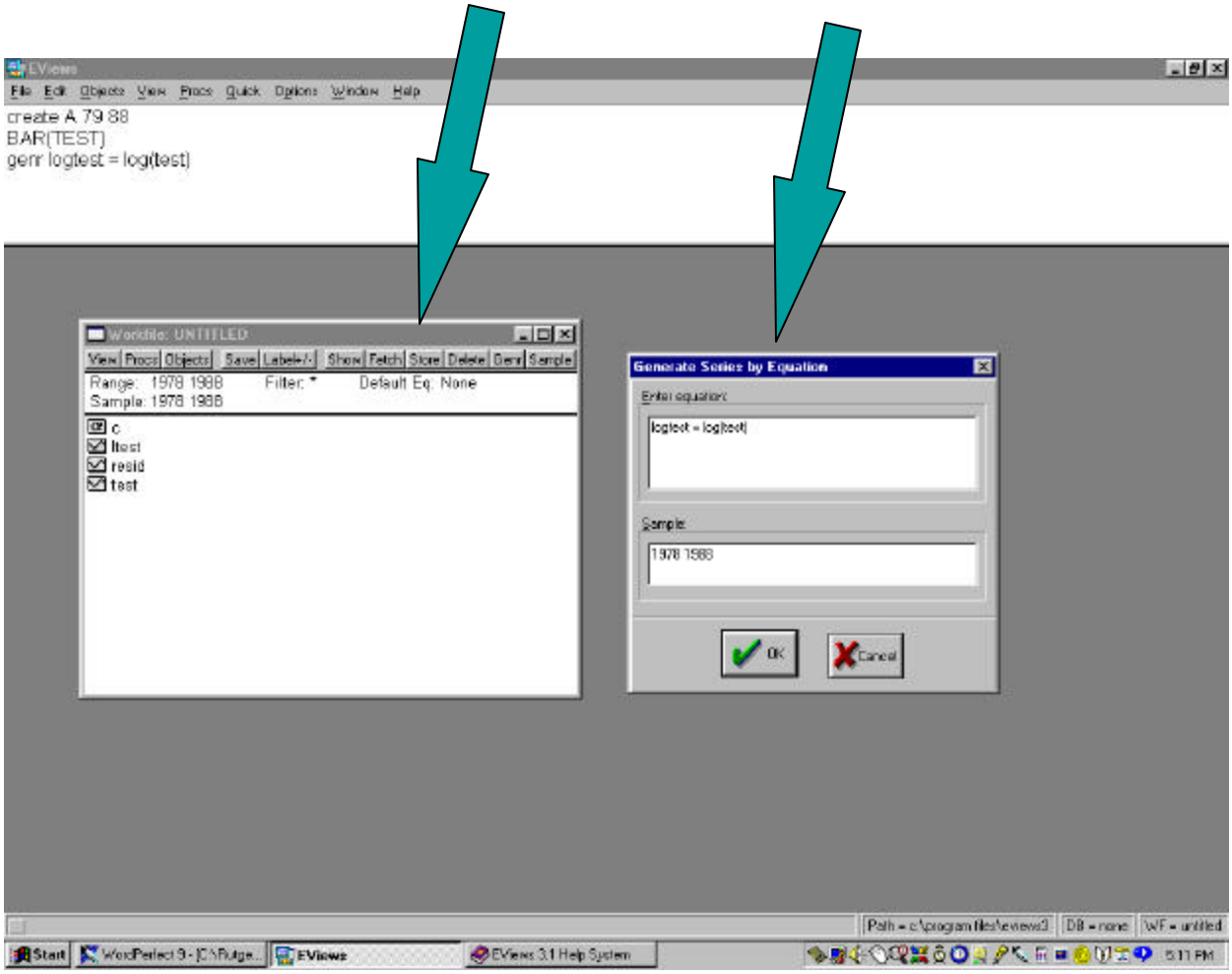
One of the most powerful features of EViews is the ability to use and to process mathematical expressions. EViews contains an extensive library of built-in operators and functions that allow you to perform complicated mathematical operations on your data with just a few keystrokes. In addition to supporting standard mathematical and statistical operations, EViews provides a number of specialized functions for automatically handling the leads, lags and differences that are commonly found in time series data.

An EViews expression is a combination of numbers, series names, functions, and mathematical and relational operators. In practical terms, you will use expressions to describe all mathematical operations involving EViews objects. As in other programs, you can use these expressions to calculate a new series from existing series, to describe a sample of observations, or to describe an equation for estimation or forecasting. However, EViews goes far beyond this simple use of expressions by allowing you to use expressions virtually anywhere you would use a series.

3.4.1 Using Menus

To create or modify a series, select Quick/Generate Series… or click on the **Genr** button on the workfile toolbar. EViews opens a window prompting you for additional information. You should enter the assignment statement in the upper edit box, and the relevant sample period in the lower edit box. The assignment statement is actually an implicit loop over observations. Beginning with the first observation in the sample, EViews will evaluate the assignment statement for each included observation. See the example windows below. Also see Section 3.4.2 for equation specifications.

Click the GENR button on the workfile window, like the one on the left below, and the **Generate Series by Equation** window will appear like the one on the right below.



3.4.2 Using the Command Window

Using the Command Window, Eviews has a very simple command for generating new series or transforming an existing series. The command has the general form:

GENR new_series operator formula

where

- **GENR** is the required Eviews command that indicates a transformation will follow (This is used in the Command Window only. Do not use GENR from the menu option.);
- **operator** is an equation indicator such as an equal sign (=); operators are listed below;
- **new_series** is the new series name;
- **formula** is the transformation involving a command and possibly an old series name.

For example:

GENR Z = log(REV)

creates or generates a new series called Z by taking the natural log of an existing series, REV.

Any number of pairs of parentheses may be used to indicate the order in which the elements of the formula should be evaluated. For example:

GENR H = (A + B/(H + K))^2

says add H and K, divide the sum into B, add the result to A, and square the whole thing.

The most common operators and functions are:

Operator/function	Explanation
+	add
-	subtract
*	multiply
/	divide
^	raise to a power
>	greater than; X>Y has the value 1 if X exceeds Y and 0 otherwise
<	less than; X<Y has the value 1 if Y exceeds X and 0 otherwise
<>	not equal; X<>Y has the value 1 if X differs from Y and 0 otherwise
<=	less than or equal; X<=Y has the value 1 if X does not exceed Y and 0 otherwise
>=	greater than or equal; X>= Y has the value 1 if Y does not exceed X and 0 otherwise
AND	combines logical operators; X>Y AND Z>Y has the value 1 if BOTH conditions are met and 0 otherwise
OR	combines logical operators; X>Y OR Z>Y has the value 1 if EITHER condition is met and 0 otherwise
log(X)	natural log of X
exp(X)	exponentiation, e^X
abs(X)	absolute value of X
sqr(X)	square root of X
C(X)	value of a coefficient X where X is a number from 1 to 100
dnorm(X)	standard normal density function of X
cnorm(X)	standard cumulative normal distribution function of X
nrnd	returns a normally distributed random number with variance equal to 1

The series values operated on by the GENR command are defined by the current SMPL setting. If, for instance, the entire range of observations for, say, GDP is 1970 to 1990 but the following is entered into Eviews

SMPL 1985 1987
GENR gdplog = log(GDP)

then only the GDP values for 1985, 1986 and 1987 will be logged.

Dummy variables, which will be discussed extensively in the lectures, can easily be created. Suppose you have a series called INCOME and you want to create a new series called HIGH that is 1 if income is greater than $50,000 and 0 if income is less than or equal to $50,000. You would use this statement:

GENR high = income > 50000

Suppose you want to be more imaginative and create a dummy variable that is 1 if income is greater than $50,000 AND years of education is at least 13 years. You would then use:

GENR high = income > 50000 and educ >= 13

This last example assumes, of, course, that the variable EDUC is in your dataset along with INCOME.

A common variable in econometric models using time series is a trend. This just shows how the data move through time. A simple command allows you to create a trend. As an example, let's create a trend variable that takes the value 0 in 1978, 1 in 1979, 2 in 1980,..., 10 in 1988. First type

SMPL 78 78

Then type

GENR TREND=0

This will create a variable called TREND with a value of zero in 1978. Then type the following long string of commands:

SMPL 79 81
GENR TREND=TREND(-1)+1

Actually, there is an easier way to generate a trend series in EViews since this is done so often. The GENR command supports many special functions, including one for generating a trend variable. To create a trend variable that starts with zero in 1979 you type:

GENR TREND=@TREND(78)

Now look at the series you just created.

Try a variation of @TREND using

GENR TREND = @TREND(80)

Be sure you understand what @TREND is doing.

GENR can be used to calculate scalars as well as series. A scalar is a single number instead of a series. Scalars are stored in a coefficient vector, C, which is listed in the workfile window, and may be accessed later for other GENR operations. There is room for 751 scalars in EViews. You can enter a scalar into the C vector either by clicking on C in the workfile window or by using the GENR command and indicating a location for the scalar value. To specify a scalar calculation, place a coefficient to the left of the equal sign instead of a series name in the GENR statement. For example:

GENR C(99) = log(5)

sets the 99th element of C equal to the natural log of 5 while

GENR C(33) = 2.54*C(2)^C(9)

sets the 33rd element of C equal to the 2nd element multiplied by 2.54, all to the power of the 9th element of C. Double clicking the C series will show the log of 5 in spot 99.

If a series appears in the equation of a scalar, Eviews uses the observations specified by the LOWER bound of the current SMPL, plus any offset specified by the equation. Thus, if the current SMPL is set for annual data from 1950 to 1990, then

GENR C(1) = GDP

sets C(1) equal to the 1950 value of GDP, and

GENR C(25) = GDP(6)

sets C(25) equal to the 1956 (1950 + 6) value of GDP.

As a word of advise when using scalars, store your scalars in values of C that are greater than 80. Eviews uses the lower numbers to store regression results.

There are a number of special scalar functions available that apply to the current SMPL:

Function	Explanation
@SUM(X)	sum of X
@MEAN(X)	mean of X
@VAR(X)	variance of X
@SUMSQ(X)	sum of squared X
@OBS(X)	number of valid observations on X
@COV(X,Y)	covariance between X and Y
@COR(X,Y)	correlation between X and Y
@CROSS(X,Y)	cross product of X and Y

For example:

GENR C(80) = @mean(X)

stores the mean of X in cell 80. The mean is taken over the whole range of the current SMPL.

The following statistical functions return a scalar answer when X is a scalar and a series answer when X is a series:

Function	Explanation
@DNORM(X)	standard normal density function of X
@CNORM(X)	standard cumulative normal distribution function of X
@TDIST(X,a)	t-distribution of X with "a" degrees-of-freedom
@FDIST(X,a,b)	F-distribution of X with "a,b" degrees-of-freedom
@CHISQ(X,a)	Chi-squared distribution of X with "a" degrees-of-freedom

There are also special functions to operate on a whole series:

Function	Explanation
@MOVAV(X,n)	n period moving average of X, where n is an integer
@MOVSUM(X,n)	n period moving sum of X, where n is an integer
@TREND(d)	time trend variable normalized to be 0 in period d, where d is a date or an observation number
@SEAS(d)	seasonal dummy equal to 1 when the quarter or month equals d and 0 otherwise

Examples:

GENR gapx = x - @mean(x)

returns a new series called GAPX which is the value of X minus the mean of X over the current SMPL.

Note that @ functions can only have series names, as opposed to expressions, for their arguments. For example:

GENR mavg = @MOVAV((X+Y),12)

is illegal because it includes an expression which is (X+Y). You could use two GENR statements to get the answer you want:

GENR Z = X + Y
GENR MAVG = @MOVAV(Z,12)

Finally, Eviews can be used in a calculator mode. To sum 2 and 2, just enter

= 2 + 2

and you will get 4. Just use an equal sign followed by an expression. The functions described above can be used:

= @MEAN(GDP)

returns the mean of GDP for the current SMPL. This answer, by the way, can not be stored in the coefficient vector.

See the EViews Help under CONTENTS/REFERENCE (COMMANDS and FUNCTIONS for more detail.

Command	Description	Options	Examples
Bar	Draw a bar chart	• a (default) Automatic scaling. The series are graphed in their original units and the range of the graph is chosen to accommodate the highest and lowest values of the series. • d Dual scaling. The first series is scaled on the left and all other series are scaled on the right. • s Stacked bar graph. Each bar represents the cumulative total of the series listed. • l Bar graph for the first series listed and a line graph for all subsequent series. • x Same as the l option with dual scaling. • o=graph_name Use options from the specified graph as a template. • t=graph_name Use options, text, and shading from the specified graph as a template. • p Print bar graph.	BAR(A) GDP BAR(L) GDP M1A

Command	Description	Options	Examples
CREATE	Creates a new work file	• a Annual. • s Semi-annual. • q Quarterly. • m Monthly. • w Weekly. • d Daily (5 day week). • 7 Daily (7 day week). • u Undated or irregular. NOTE: these options do NOT go in parentheses	CREATE M 1980.03 1983.12 CREATE Q 85.1 89.4 CREATE A 50 90 CREATE U 250
D	Deletes a series from RAM		D Income
GENR	Generate a new series, transform data, calculate statistics		See section on series generation
HIST	Draws histogram	• p Print the histogram.	HIST AGE HIST(G) GDP
LABEL	Label a series.	• c Clears all text fields in the label • d Sets the description field to text. • s Sets the source field to text. • u Sets the units field to text. • r Appends text to the remarks field as an additional line. • p Print the label view.	LABEL GDP LABEL(P) CONSUMP
LS	Least squares regression; specify a constant with C	These will be discussed as needed	LS INCOME AGE EDUC

Command	Description	Options	Examples
NRND	Generates normally distributed random numbers		GENR X = 10*NRND
PIE	Produce a pie chart	• o=graph_name Use appearance options from the specified graph. • t=graph_name Use appearance options and copy text and shading from the specified graph. • p Print the pie chart.	PIE SALES
PRINT	Prints series with one observation per line	• p Override the default output orientation (set by Print Setup) and print in portrait. • l Override the default output orientation (set by Print Setup) and print in landscape.	PRINT GDP INVEST
Rename	Rename a series; list old name first then new name		RENAME OLDGDP NEWGDP
RND	Generates uniformly distributed random numbers		GENR Z = 10*RND

Command	Description	Options	Examples
SCAT	Generates a scatter plot	• c connect adjacent observations with a line. The line will not connect observations that are separated by a break in the sample. • r draw a inear regression line for each series on the vertical axis. • b both c and r options. Same as specifying c, r. • m make multiple scatter plots for more than two series (cannot be used together with c, r, or b options). • o=graph_name use appearance options from the specified graph object. • t=graph_name use appearance options and copy text and shading from the specified graph. • p Print the scatter plot.	SCAT MONEY RGDP SCAT(R) MONEY RGDP
SHOW	Display a series		SHOW GDP MONEY INC
SMPL	Sets active sample size	The following @ functions can be used in a smpl command: @all The whole workfile range @first The first observation in the workfile @last The last observation in the workfile	SMPL 55.1 60.4 SMPL 85 90 SMPL 87.04 89.11

Command	Description	Options	Examples
SORT	Sort a series; this sorts the whole work file	D: descending order	SORT AGE SORT(D) INCOME

Eviews allow you use the coefficients from a least squares regression in other calculations. The coefficients are stored in the coefficient vector C. The first coefficient estimated is stored in C(1), the second in C(2), and so on. You could, therefore, use these again in a GENR statement such as

GENR CHAT = C(1) + C(2)*GDP

Residuals from a least squares estimation are always analyzed and used in other equations. They must, therefore, be stored for later retrieval. Eviews helps with this by temporarily saving residuals in a series called RESID. These can then be used just as you would any other series. There is one problem with the series RESID, however - if you estimate another equation, the series is overwritten with new residuals. To save your residuals, you must generate another series with, for example,

GENR RES = RESID

Eviews also saves various statistics from a least squares regression so you can use them later. The following table shows how they are stored:

Command	Statistic
@R2	R-squared
@RBAR2	Adjusted R-squared
@SE	Standard error of the regression
@SSR	Sum of squared residuals
@DW	Durbin -Watson
@F	F
@LOGL	Value of the log-likelihood
@REGOBS	Number of observations in the regression
@MEANDEP	Mean of the dependent variable
@SDDEP	Standard deviation of the dependent variable
@NCOEF	Total number of estimated coefficients

You can use these in a GENR statement. For example:

GENR PLUS = GDP + 2*@MEANDEP