

MacroEconometric Forecasting



Topic:

Introduction to Forecasting with EViews

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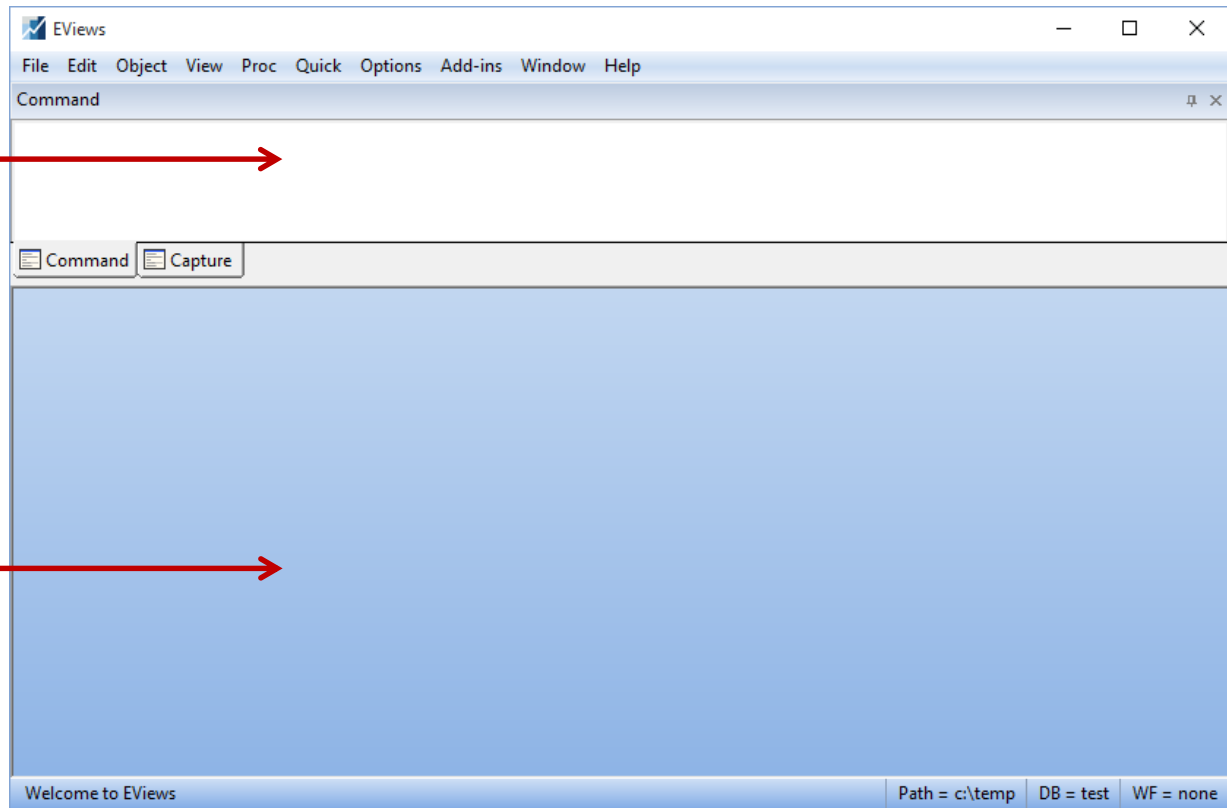
What is EViews?

- EViews is an easy-to-use statistical, econometric, and economic modeling package.
- There are three ways to work in EViews:
 - Graphical user interface (using mouse and menus/dialogs).
 - Single commands (using the command window).
 - Program files (commands assembled in a script executed in batch mode).



EViews Desktop

**Command
Window**



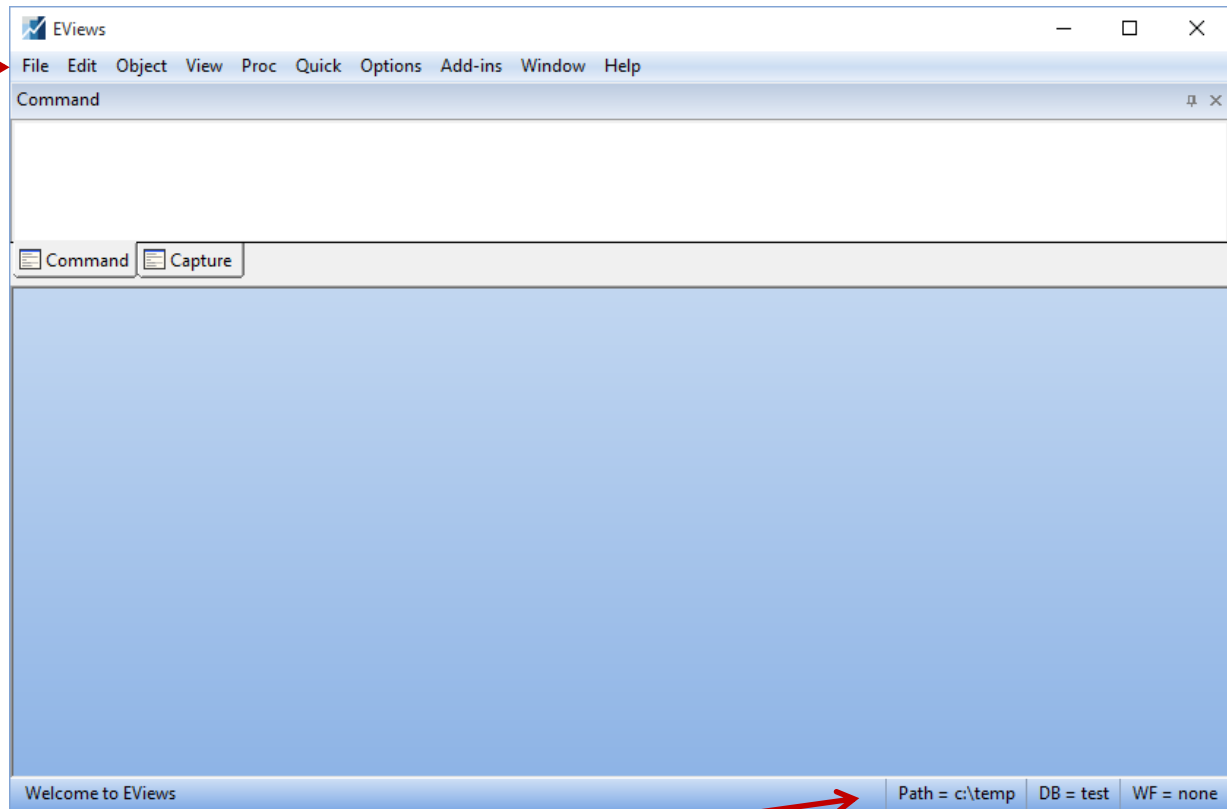
**Object
Window/
Work Area**





EViews Desktop Details

Main Menu



Note: Path/Database/Workfile
can be changed by double-clicking in each.

Path/directory

Database

Workfile





EViews Workfile and Objects

- EViews does NOT open up with a “blank” generic document (unlike Word ®, Excel ®, etc.).
- EViews documents (aka “workfiles”) need to be created and are not generic (they will contain information about your data, etc.).
- EViews is an “object”- oriented program. Objects are collections of information related to a particular analysis (series, groups, equations, graphs, tables).
- Workfiles are holders of these “objects”.



Object Types

Series, Groups and Equations are the most common objects in EViews.

	Alpha		Pool		Sym
	Coef		Rowvector		System
	Equation		Sample		Table
	Factor		Scalar		Text
	Graph		Series		Valmap
	Group		Spool		Var
	Logl		Sspace		Vector
	Matrix		String		
	Model		Svector		



EViews Workfile

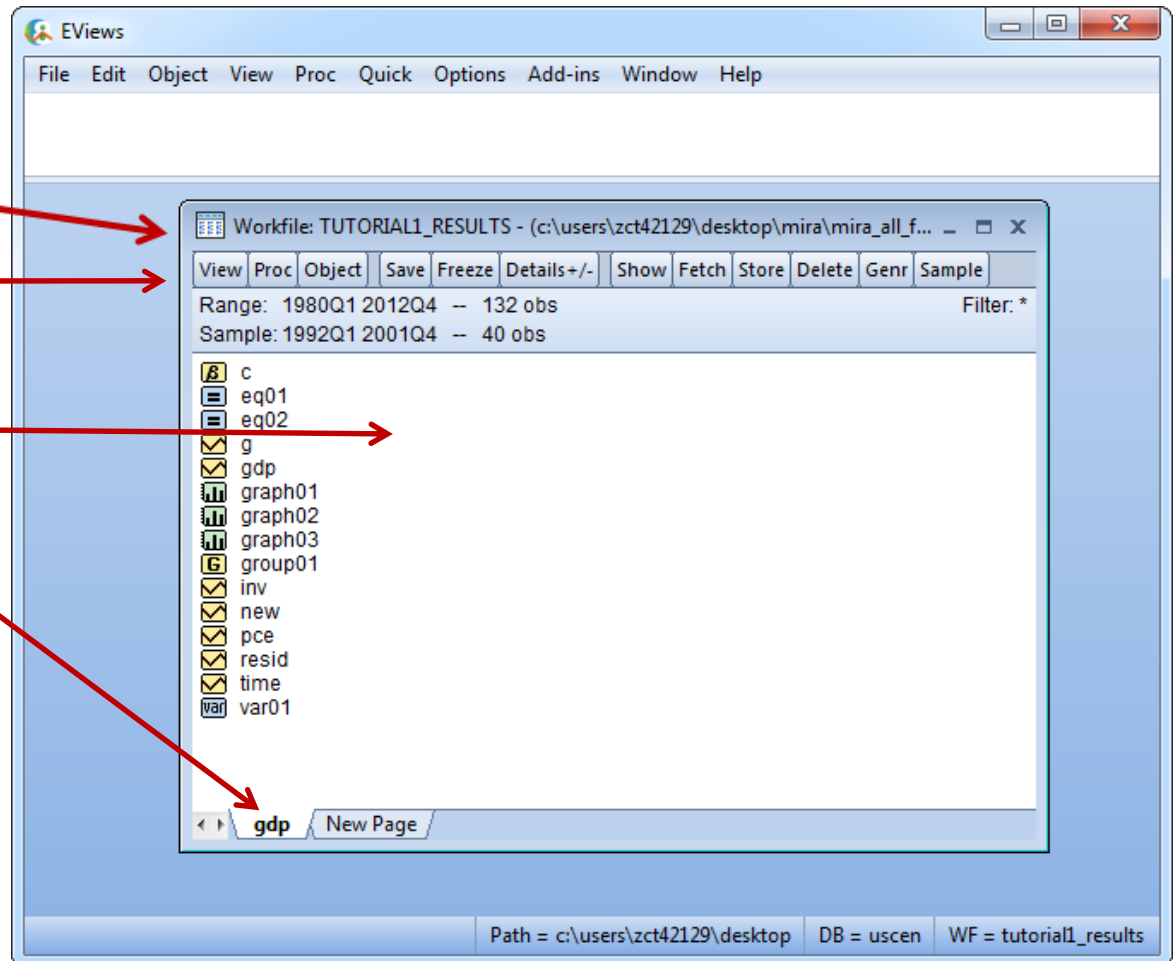
Workfile title bar

Workfile tool bar

Workfile Window

Workfile:

- ✓ Contains at least one page
- ✓ Each page contains a list of objects on that page





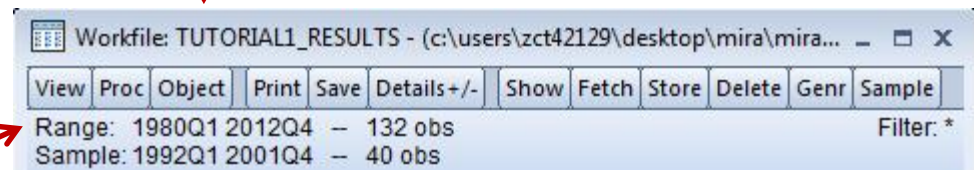
EViews Workfile (cont'd)

Structure of the workfile

- ❑ The data in this example is *dated* and has quarterly frequency covering the period from 1980 to 2012.

- ❑ **Range:** shows the entire range of the data in the workfile. Here the range is from Q1 1980 to Q4 2012

Name of the workfile
(Tutorial1_results in this example)

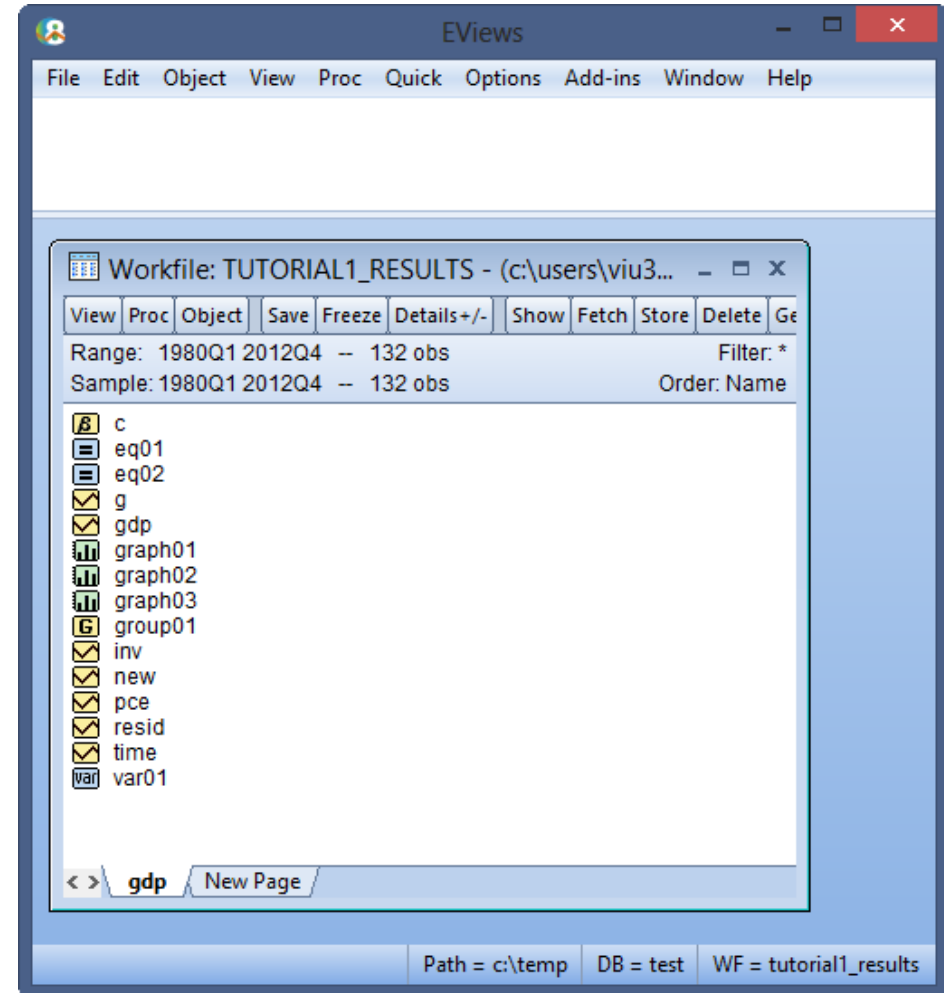


- ❑ **Sample:** This is the part of data we are currently working with. In this example, the sample runs from Q1 1992 to Q4 2001.



EViews Workfile and Objects

- This screenshot shows a list of **Objects** in the workfile.
- It is color-coded by **Object** type:
 - ✓ Yellow icons are data objects
 - ✓ Blue icons are estimation objects
 - ✓ Green icons are view objects (tables, graphs, etc...)
- Double clicking on one of these Object icons will open it up.
- Each **Object** has its own menu.
- Once an object is open, the menus in EViews change to represent the features available for that object.





EViews Workfile and Objects (cont'd)

- EViews 8 provides you with a more detailed look of the objects in your workfile.
- For the “**Details**” view, Click on **View** → **Details +/-** on the workfile toolbar (or double click the **Details +/-** button on the workfile toolbar).
- The view changes as shown here.
- Each object now has a separate column in the details view.
- You may sort the objects by an attribute (Name, Type, etc.) by clicking on the column header.
- You can also resize or drag the columns which allows you to alter their position and width.

Workfile: TUTORIAL1_RESULTS - (c:\users\viu35889\dropbox\view... - □ ×

View Proc Object Save Freeze **Details +/-** Show Fetch Store Delete Genr Sample

Range: 1980Q1 2012Q4 -- 132 obs Filter: * ^
Sample: 1980Q1 2012Q4 -- 132 obs Order: Name

Name	Type	Last Update	Description
<input type="checkbox"/> c	coef	02/14/13 21:43	
<input type="checkbox"/> eq01	equation	02/14/13 21:43	
<input type="checkbox"/> eq02	equation	02/14/13 21:43	
<input checked="" type="checkbox"/> g	series	05/30/12 19:36	government: St. Louis Fred
<input checked="" type="checkbox"/> gdp	series	05/30/12 19:36	gdp ; St Louis Fred
<input type="checkbox"/> graph01	graph	02/14/13 21:46	
<input type="checkbox"/> graph02	graph	02/14/13 21:46	
<input type="checkbox"/> graph03	graph	02/14/13 21:46	
<input checked="" type="checkbox"/> group01	group	05/30/12 19:36	
<input checked="" type="checkbox"/> inv	series	05/30/12 19:36	
<input checked="" type="checkbox"/> new	series	05/30/12 19:40	
<input checked="" type="checkbox"/> pce	series	05/30/12 19:36	
<input checked="" type="checkbox"/> resid	series	02/14/13 21:43	

< > gdp New Page < >



The Object Window

Main menu

Workfile Toolbar

Object Toolbar

(in this example,
equation toolbar)

Object Window

(in this example,
equation window)

The screenshot shows the EViews software interface. The main menu at the top includes File, Edit, Object, View, Proc, Quick, Options, Add-ins, Window, and Help. The workfile toolbar below it includes View, Proc, Object, Save, Freeze, Details+/-, Show, Fetch, Store, Delete, and Generate. The object toolbar on the left lists various objects: c, eq01, eq02, g, gdp, graph01, graph02, graph03, group01, inv, new, pce, resid, time, and var01. The object window is open for 'Equation: EQ01' in the workfile 'TUTORIAL1_RESULTS::gdp\'. It displays the following information:

Dependent Variable: LOG(GDP)
Method: Least Squares
Date: 02/14/13 Time: 21:43
Sample (adjusted): 1980Q1 2012Q1
Included observations: 129 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	8.673003	0.006706	1293.407	0.0000
TIME	0.007253	9.06E-05	80.09369	0.0000


Additional statistics shown below the table:

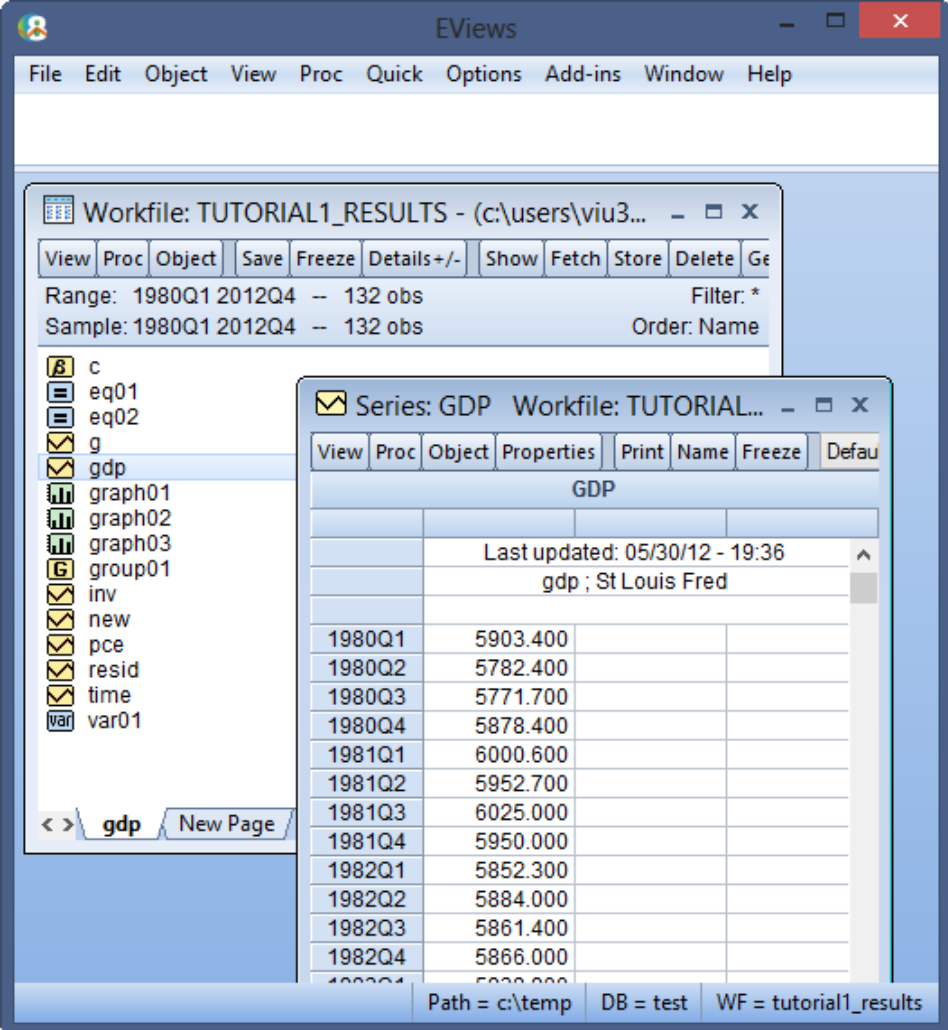
R-squared	0.980587	Mean dependent var	9.137216
Adjusted R-squared	0.980434	S.D. dependent var	0.273823
S.E. of regression	0.038302	Akaike info criterion	-3.671257
Sum squared resid	0.186313	Schwarz criterion	-3.626919
Log likelihood	238.7961	Hannan-Quinn criter.	-3.653241
F-statistic	6415.000	Durbin-Watson stat	0.041724
Prob(F-statistic)	0.000000		

The status bar at the bottom shows Path = c:\temp, DB = test, and WF = tutorial1_results.



The Series Object

- This is the main data object.
-  **gdp** - has a yellow icon with a little line graph in it.
- It contains one column of data.
- Opening a series will reveal a spreadsheet view with a single column showing the data in the series.



Workfile: TUTORIAL1_RESULTS - (c:\users\viu3... - □ ×

View Proc Object Save Freeze Details+/- Show Fetch Store Delete Ge

Range: 1980Q1 2012Q4 -- 132 obs Filter: *

Sample: 1980Q1 2012Q4 -- 132 obs Order: Name

- c
- eq01
- eq02
- g
- gdp
- graph01
- graph02
- graph03
- group01
- inv
- new
- pce
- resid
- time
- var01

< > **gdp** New Page

Series: GDP Workfile: TUTORIAL... - □ ×

View Proc Object Properties Print Name Freeze Defau

GDP

Last updated: 05/30/12 - 19:36

gdp ; St Louis Fred

1980Q1	5903.400		
1980Q2	5782.400		
1980Q3	5771.700		
1980Q4	5878.400		
1981Q1	6000.600		
1981Q2	5952.700		
1981Q3	6025.000		
1981Q4	5950.000		
1982Q1	5852.300		
1982Q2	5884.000		
1982Q3	5861.400		
1982Q4	5866.000		

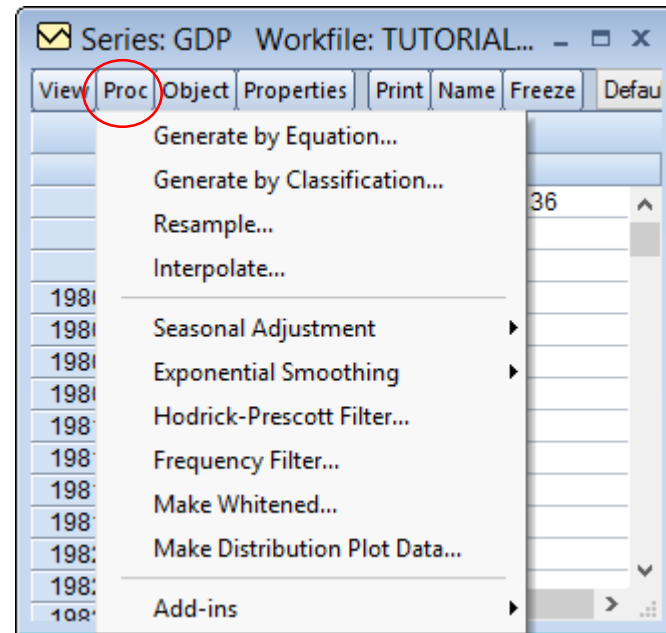
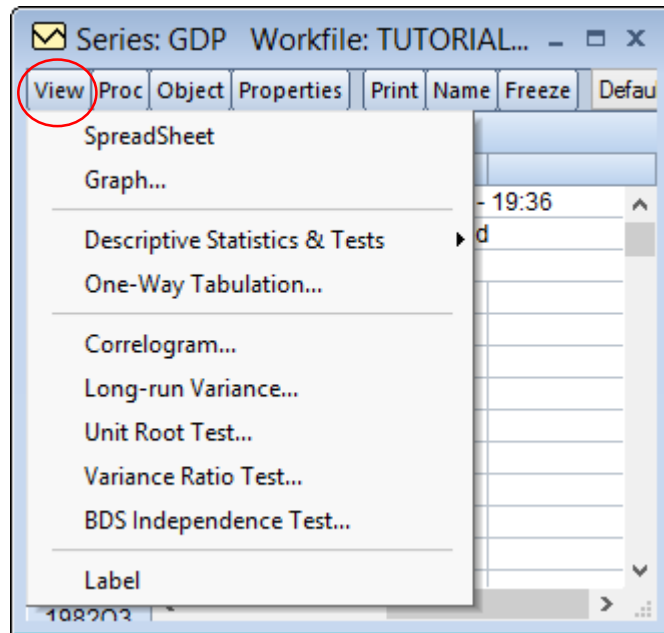
Path = c:\temp DB = test WF = tutorial1_results



The Series Object (cont'd)

To open a Series

1. Double click on the series.
2. Once a series is open, you can click on **View** and **Proc** menus in the workfile to see available actions. Since a Series is a single column of data, only actions for a single column of data are available (views and tests).





The Group Object

- This is a collection of series objects.
- **G** group01 - has a yellow icon with a capital G.
- It contains multiple columns of data.
- Opening a group will display a spreadsheet view with multiple columns showing the data in each series in the group.

The screenshot shows the EViews software interface. The main window displays a spreadsheet view of a group object named 'GROUP01' within the workfile 'TUTORIAL1_RESULTS'. The spreadsheet has columns for GDP, PCE, INV, and G, and rows for quarterly data from 1980Q1 to 1984Q2. The value 5903.4 is highlighted in the first row under the GDP column.

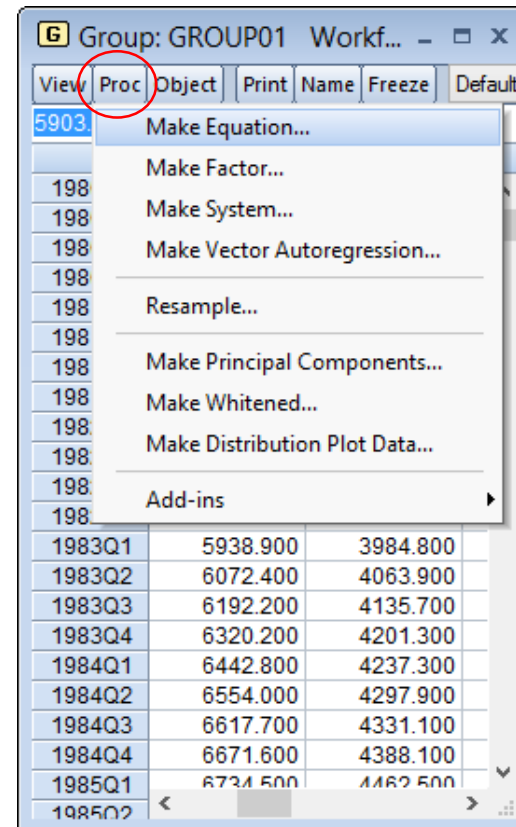
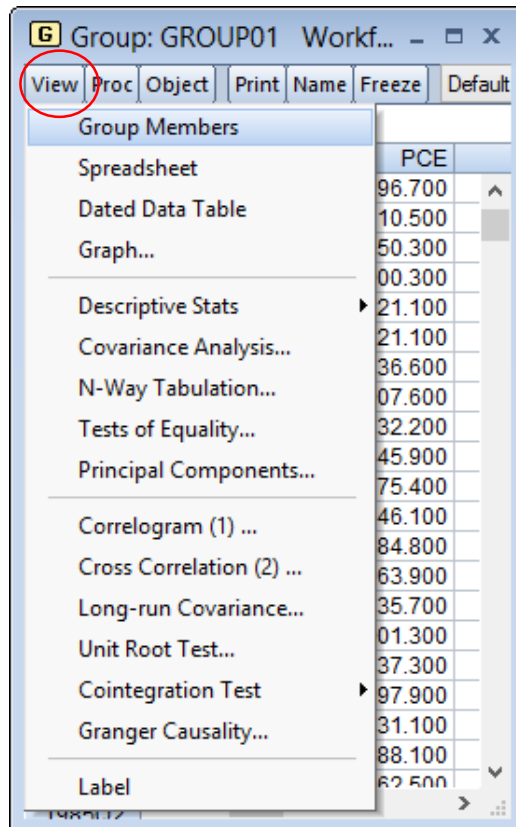
	GDP	PCE	INV	G
1980Q1	5903.400	3796.700	778.3000	1365.400
1980Q2	5782.400	3710.500	708.1000	1369.700
1980Q3	5771.700	3750.300	654.1000	1350.800
1980Q4	5878.400	3800.300	720.6000	1349.400
1981Q1	6000.600	3821.100	792.2000	1367.300
1981Q2	5952.700	3821.100	754.5000	1370.400
1981Q3	6025.000	3836.600	801.3000	1367.300
1981Q4	5950.000	3807.600	770.2000	1379.900
1982Q1	5852.300	3832.200	690.0000	1378.500
1982Q2	5884.000	3845.900	689.4000	1386.500
1982Q3	5861.400	3875.400	681.3000	1396.000
1982Q4	5866.000	3946.100	620.7000	1420.100
1983Q1	5938.900	3984.800	642.8000	1430.800
1983Q2	6072.400	4063.900	704.8000	1443.000
1983Q3	6192.200	4135.700	752.2000	1468.000
1983Q4	6320.200	4201.300	831.4000	1443.200
1984Q1	6442.800	4237.300	918.4000	1457.800
1984Q2	6554.000	4297.900	949.4000	1489.200



The Group Object (cont'd)


To open a Group

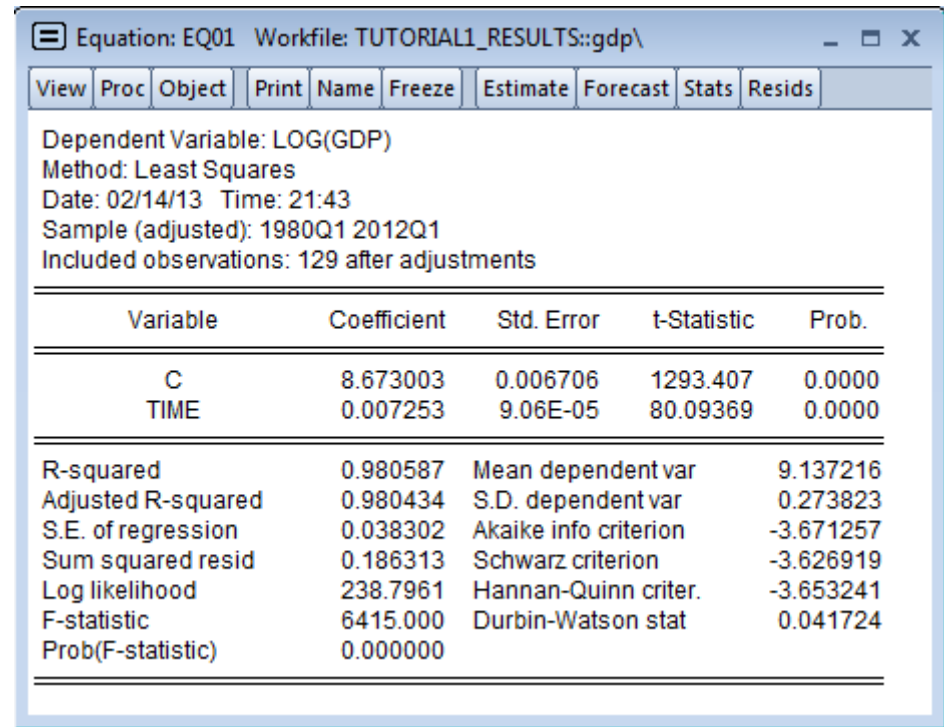
1. Double click on **G** .
2. Once a Group is open, you can click on **View** and **Proc** menus to see available actions. Actions that require multiple columns of data are now available (views and tests).





The Equation Object

- This is a single equation estimation object.
-  eq01 -- has a blue icon with an equal (=) sign.
- This is the main estimation object in EViews.
- Opening an equation will reveal the main results of the estimation.



Equation: EQ01 Workfile: TUTORIAL1_RESULTS::gdp\

View Proc Object Print Name Freeze Estimate Forecast Stats Resids

Dependent Variable: LOG(GDP)
Method: Least Squares
Date: 02/14/13 Time: 21:43
Sample (adjusted): 1980Q1 2012Q1
Included observations: 129 after adjustments


Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	8.673003	0.006706	1293.407	0.0000
TIME	0.007253	9.06E-05	80.09369	0.0000

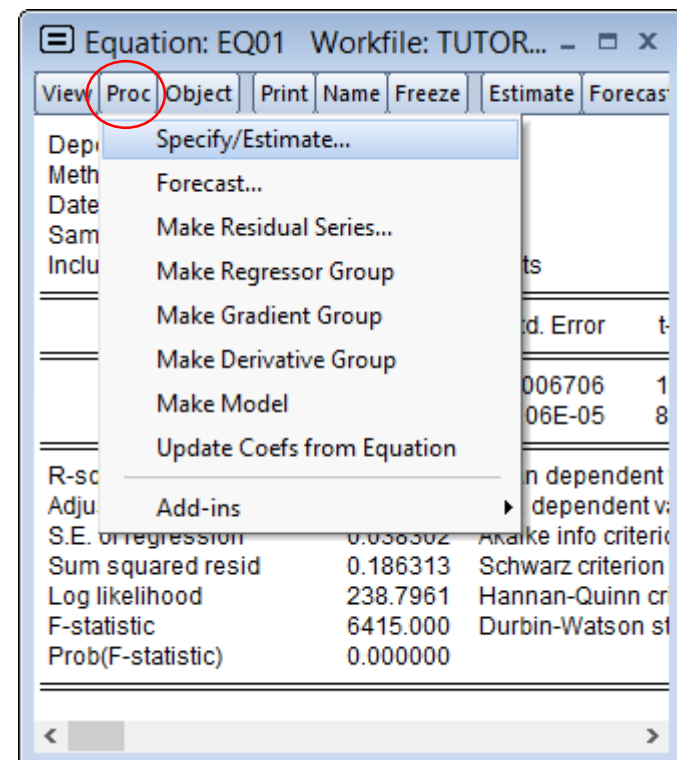
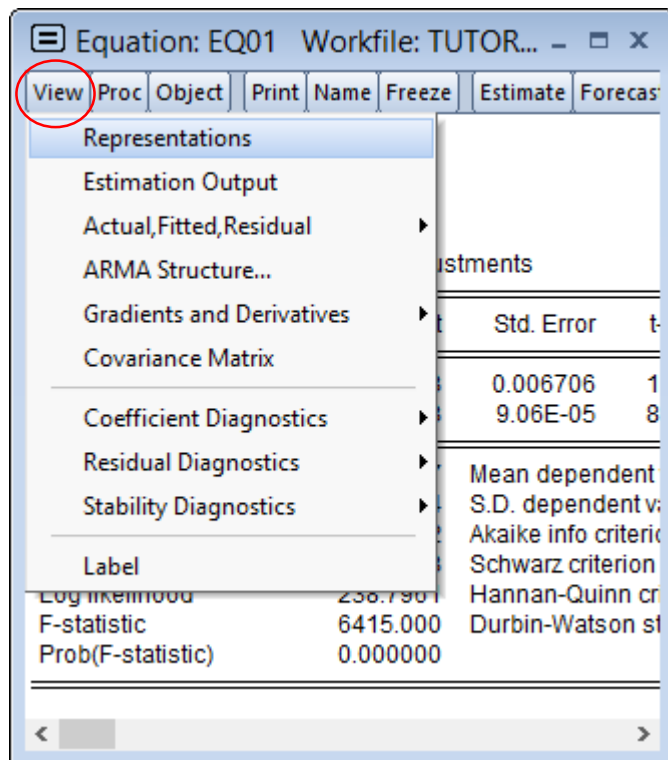
R-squared 0.980587 Mean dependent var 9.137216
Adjusted R-squared 0.980434 S.D. dependent var 0.273823
S.E. of regression 0.038302 Akaike info criterion -3.671257
Sum squared resid 0.186313 Schwarz criterion -3.626919
Log likelihood 238.7961 Hannan-Quinn criter. -3.653241
F-statistic 6415.000 Durbin-Watson stat 0.041724
Prob(F-statistic) 0.000000



The Equation Object (cont'd)


To open an Equation Object

1. Double click on .
2. Once an Equation is open, you can click on **View** and **Proc** menus to see available actions. Some of the items in the **View** and **Proc** menus will depend on the type of Equation that was estimated.



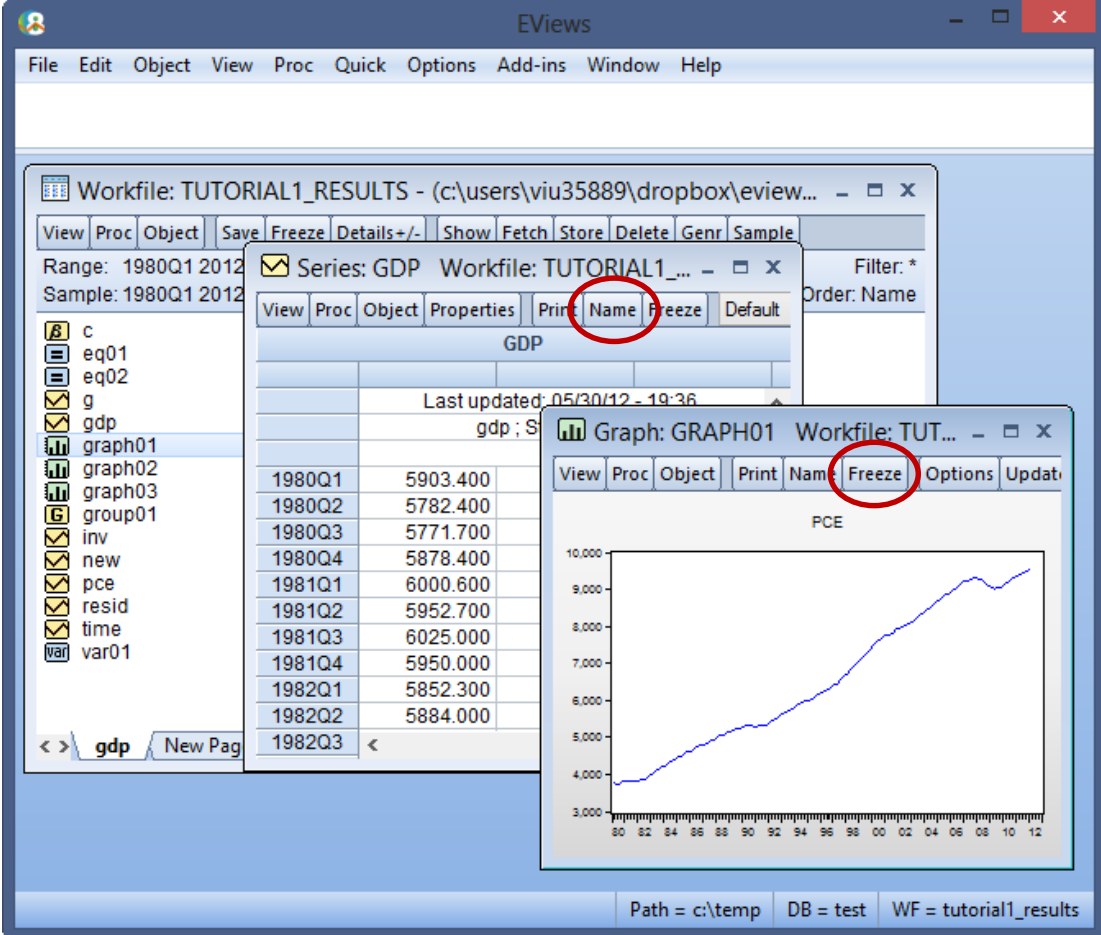


Views Objects

- These objects hold “views” of data or estimation objects.
-  graph01 - has a green icon.
- It is used to “freeze” a view of another object in time.

To create this view

1. Press the **Freeze** button on another object (*gdp* series, for example).
2. Use the **Name** button to save it in the workfile.
3. Click **OK**.



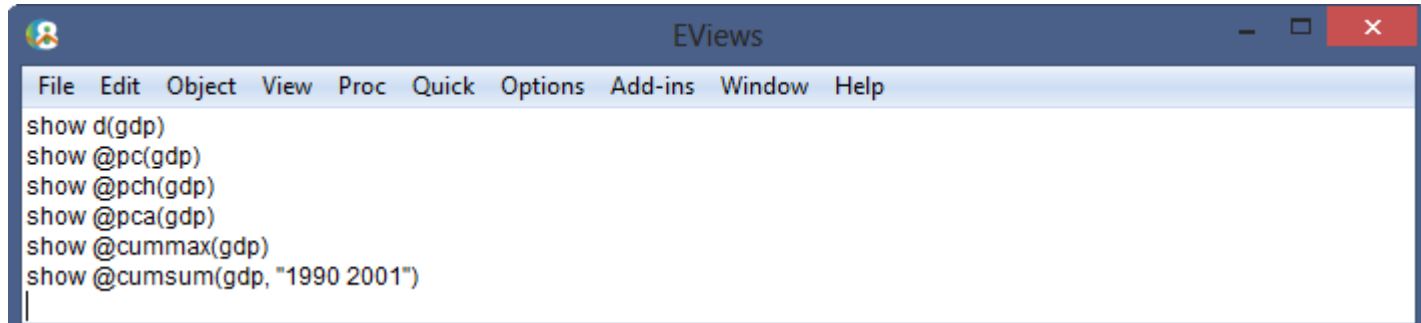
The screenshot shows the EViews software interface. The main window displays a workfile named 'TUTORIAL1_RESULTS' with a range of 1980Q1 2012. The 'Object' list on the left includes 'gdp' with a green bar chart icon. The 'Series: GDP' window is open, showing a table of data for 'gdp' from 1980Q1 to 1982Q3. The 'Name' button in the 'Series: GDP' window is circled in red. The 'Graph: GRAPH01' window is also open, showing a line graph of 'PCE' from 1980 to 2012. The 'Freeze' button in the 'Graph: GRAPH01' window is circled in red. The status bar at the bottom indicates 'Path = c:\temp', 'DB = test', and 'WF = tutorial1_results'.

Year	Value
1980Q1	5903.400
1980Q2	5782.400
1980Q3	5771.700
1980Q4	5878.400
1981Q1	6000.600
1981Q2	5952.700
1981Q3	6025.000
1981Q4	5950.000
1982Q1	5852.300
1982Q2	5884.000
1982Q3	



Commands

- The command pane provides a scrollable record of the commands typed.



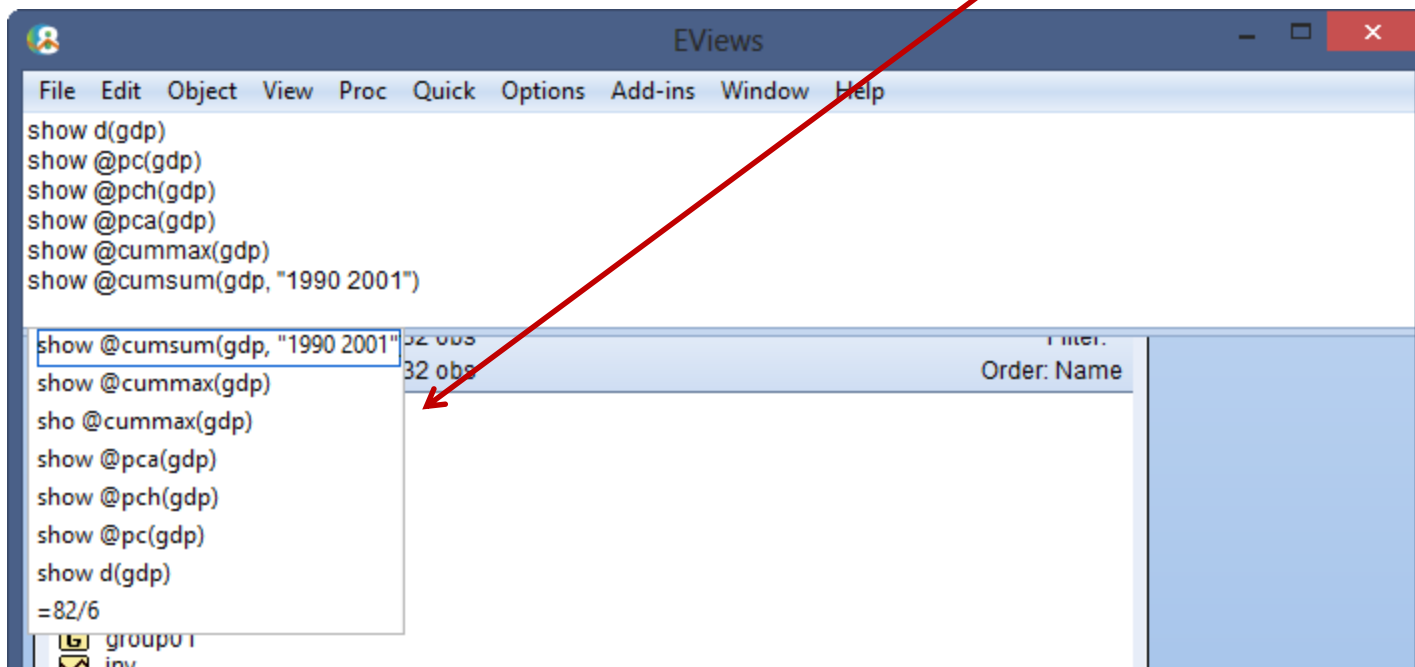
```
show d(gdp)
show @pc(gdp)
show @pch(gdp)
show @pca(gdp)
show @cummax(gdp)
show @cumsum(gdp, "1990 2001")
```

- You can scroll up to view previously executed commands.
- If you hit **Enter** in any previous lines, EViews will copy the line where the cursor is and execute that command again.



Commands (cont'd)

- To recall a list of previous commands in the order in which they were entered use “**CTRL+UP**”. The last command in the list will display in the command window.
- Hold down the **CTRL** key and press **UP** arrow to display previous commands.
- For a record of the last 30 commands, press “**CTRL+J**”.





Exercise #1

- Open the Excel file *EViewsLab_data.xls*, we will be working with the “Macro” sheet
- Create a new Workfile for today’s workshop

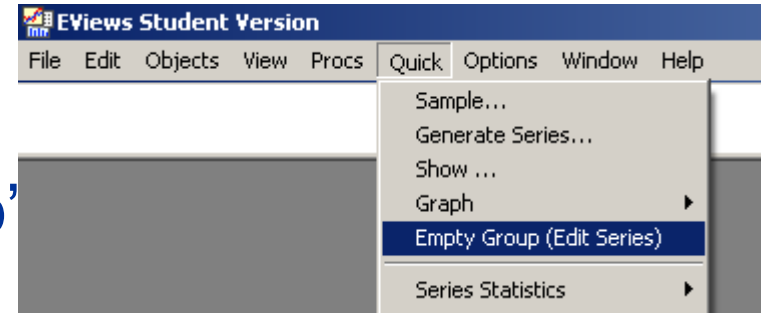


Importing Data

• Copy/Past Method

1. Open new “Empty Group”

- Quick → Empty Group
- Click on Cell 1 and press the “Up” arrow on keyboard



obs				
1				
2				
3				
4				



obs				
obs				
1				
2				
3				

2. Open Excel

- Make sure variable names are one constant “String” (no spaces!)
- Troubleshoot for other problems

3. Copy Data

4. Paste into Eviews Cell 1

Exercise #2



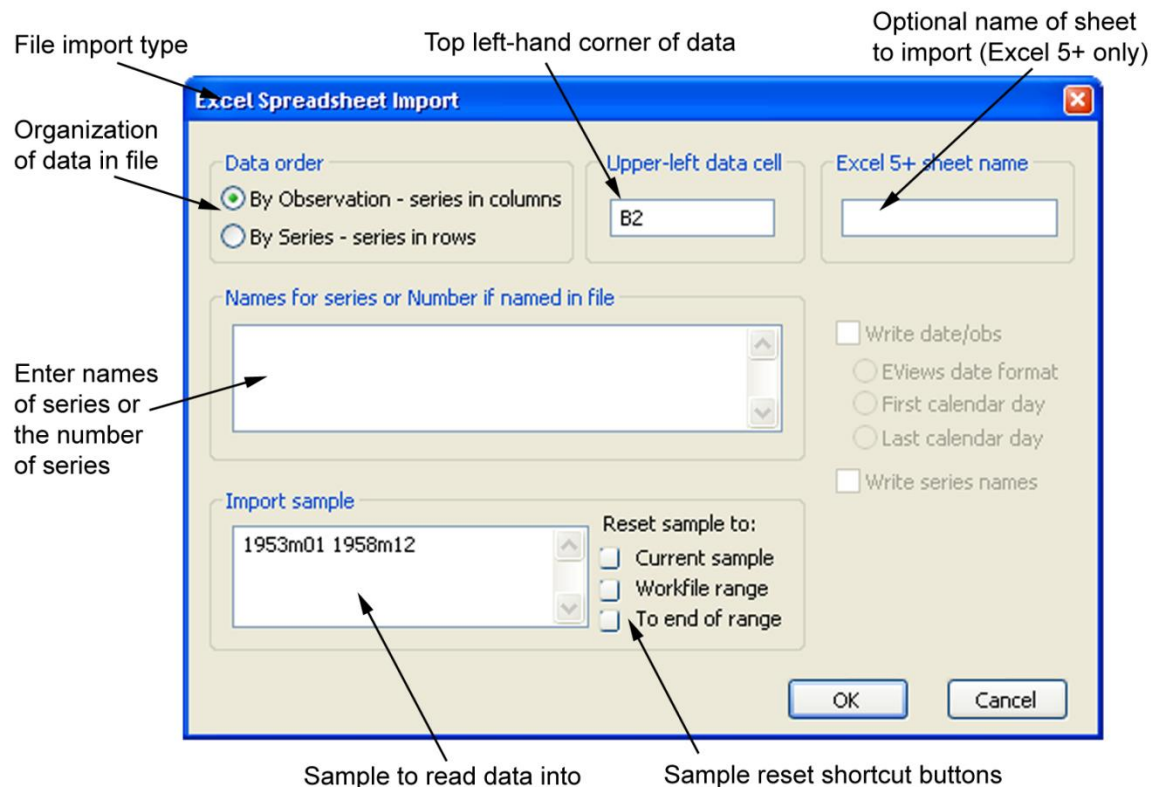
- Import data Series from Excel sheet 1: *Macro*



Importing Data

- **Import Directly**

1. Count the number of variables and CLOSE Excel file
2. Proc → Import → Read Text-Locus-File
3. Browse for Excel file
- 4.





Exercise #3

- Create a new page in the Workfile for the unstructured data in the “Micro” sheet
- Import, directly, the data from the “Micro” sheet



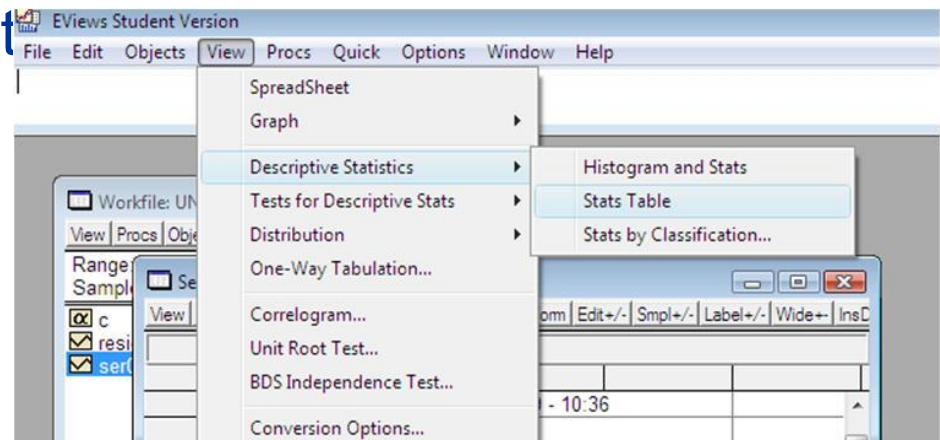
Descriptive Statistics

• Group

- Stores select series together
- Object → New Object → Group → Select Series → Name

• Descriptive Statistics

- When group spreadsheet is open:
- View → Descriptive Statistics → Correlogram





Exercise #3

- Create a group for you INDEPENDENT variables (*hint: consumption is your dependent variable*)
- Find the Standard Deviation for each variable
- Run a correlation matrix of independent variables to determine if you might have multicollinearity (*hint: look if off-diagonal absolute values are bigger than 0.5*)



Regressions

- **Create a new Equation**
 - In your Workfile:
 - Object → New Object → Equation

Separated by spaces: *Dependent variable
*Constant, c *Independent variables (or
Group)

Type of Regression

Sample Range

Equation Specification

Equation specification

Dependent variable followed by list of regressors including ARMA and PDL terms, OR an explicit equation like $Y=c(1)+c(2)*X$.

Estimation settings

Method: LS - Least Squares (NLS and ARMA)

Sample: 1960 1999

OK

Cancel

Options



Regression Tests & Fixes

- **Output**

To Run Tests

Regression Summary

Coefficient Summary

Statistics

Useful to Create Model

Estimate: Modify Regression

SAVE!

This View

Equation: EQUATION1 Workfile: EIEWS WORKSHOP

View Procs Objects Print Name Freeze Estimate Forecast Stats Resids

Dependent Variable: CONINC
Method: Least Squares
Date: 10/06/09 Time: 14:00
Sample: 1960 1999
Included observations: 40
White Heteroskedasticity-Consistent Standard Errors & Covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP	0.507961	0.156344	3.249002	0.0025
PERINC	0.330658	0.233742	1.414629	0.1655
UNEMP	9.062063	14.13841	0.640954	0.5255

R-squared 0.999238 Mean dependent var 10222.47
Adjusted R-squared 0.999197 S.D. dependent var 7220.333
S.E. of regression 204.5821 Akaike info criterion 13.55185
Sum squared resid 1548592. Schwarz criterion 13.67852
Log likelihood -268.0371 Durbin-Watson stat 0.263521

- **Name = Save to Workfile**



Regression Tests & Fixes

- **Looking at Residuals**

- In Equation View:

- View → Actual, Fitted, Residual → Actual, Fitted, Residual Table

- **Plotting Resid Vs. Fitted Values**

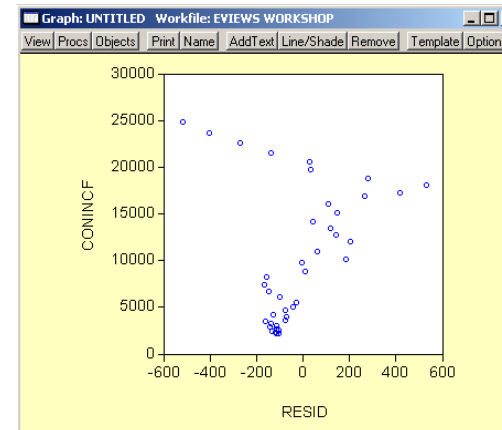
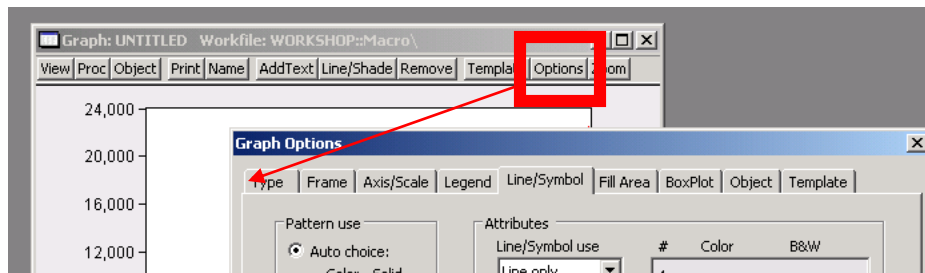
- Generate fitted values

- In Equation View: “Forecast” → OK (*is named “variable”f*)

- In Workfile: Object → New Object → Graph

- Graph: resid “variable”f

- Options → Type → Scatter





Regression Tests & Fixes

- **Heteroskedasticity**

- In Equation View:

- View → Residual Tests → White Heteroskedasticity (no cross)

- Look at Chi-square value from a table
(want a small value)

- **Fix:** Click on “Estimate”

- Click on “Options” → check box for “Heteroskedasticity consistent coefficient covariance” → OK

The screenshot shows the EViews software interface. The 'View' menu is open, and 'Residual Tests' is selected. A sub-menu is open showing various tests. The 'Heteroskedasticity Tests...' option is highlighted. Below the menu, a table displays the results of the tests.

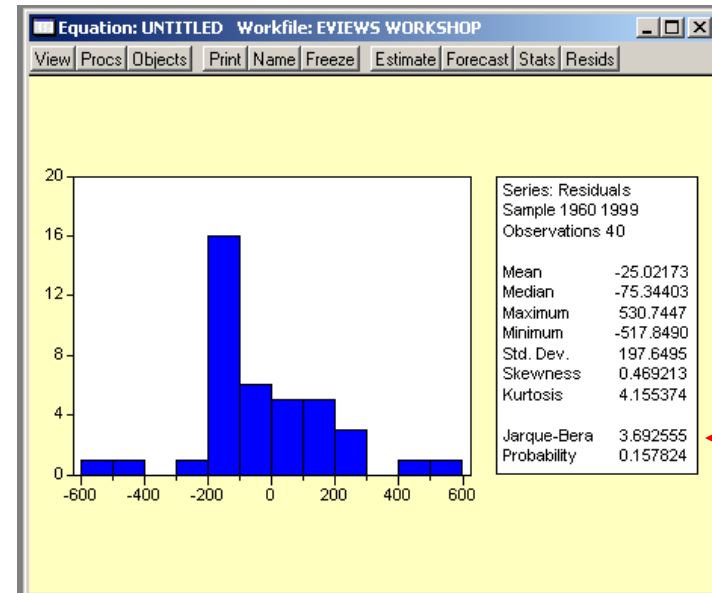
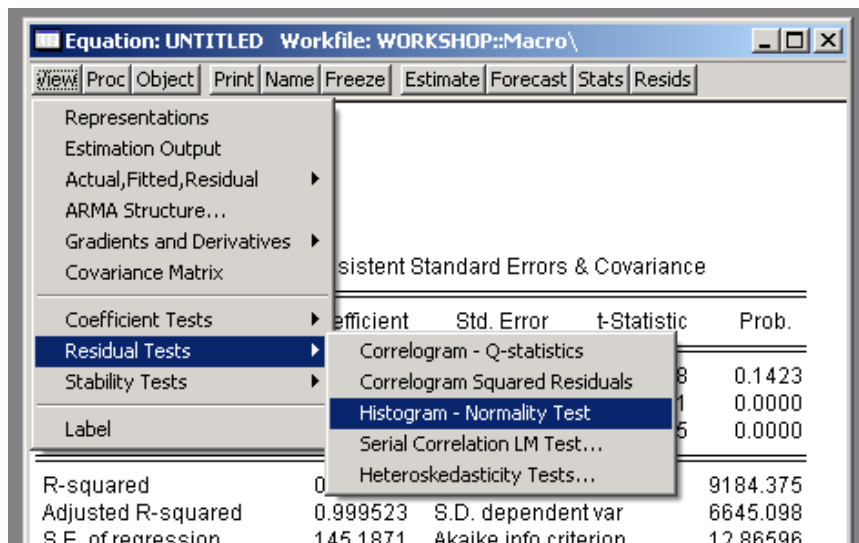
	efficient	Std. Error	t-Statistic	Prob.
Correlogram - Q-statistics	4			0.1505
Correlogram Squared Residuals	3			0.0000
Histogram - Normality Test	7			0.0000
Serial Correlation LM Test...				9184.375
Heteroskedasticity Tests...				6645.098



Regression Tests & Fixes

- **Normality**

- View → Residual Tests → Histogram-Normality Test
- Look at Jarque-Bera stat
- **Fix:** Depending on skew, you can adjust variables (ex: square, log, etc) or add/delete variables





Exercise #4

- Plot fitted values vs. residuals
- Check for Heteroskedasticity and fix if necessary
- Check for Multicollinearity
- Check for Normality



Changing/Creating Variables

- **Edit Mode**

- In Spreadsheet: Toggle “Edit+/-”
- **CAREFUL!** No “undo”



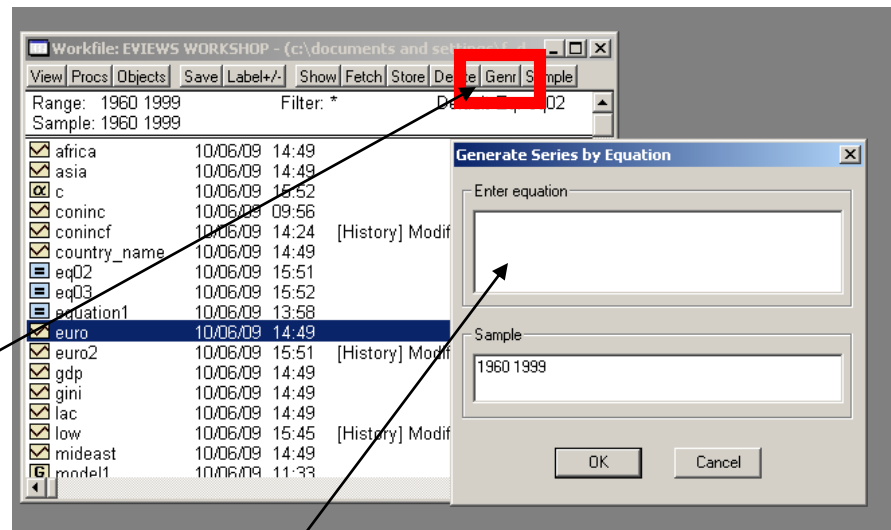
- **Generate new variable**

- In Workfile:

- Click on “Genr”
- Enter equation:

“new variable name” = *equation*

- Regular math function keys
- Lag: *variable(-1)*



Reference and source



- Conceptual Econometrics Using R (ISSN Book 41) 1st Edition, by Hrishikesh D. Vinod (Editor)
- Principles of Macroeconometric Modeling (Volume 36) (Advanced Textbooks in Economics, Volume 36) by L.R. Klein, W. Welfe, et al. | Oct 5, 1999
- Macroeconomic Modeling and Macroeconometric Simulation: Illustrated with a developing economy Model (Macroeconometric model Book 1) Book 1 of 1: Macroeconometric model | by Kannapiran Arjunan | Jun 9, 2020
- Global and National Macroeconometric Modelling: A Long-Run Structural Approach by Anthony Garratt, Kevin Lee, et al. | May 4, 2012
- Simulation of a macroeconometric model with multiple time series considerations (Wayne economic papers) by Rosemary Rossiter | Jan 1, 1982