EViews: Introductory User Guide

Graphs & Stats

Graphing | Sample statistics | Elementary statistical tests

Learning support material for the courses:

- ✓ **NMST537 Time Series Analysis**
- ✓ **NEKN432 Econometrics**

Based on official EViews Tutorials & EViews Illustrated.

EViews: Introductory User Guide

BASIC GRAPHING: BASICS

Basic Graphing in EViews

- EViews provides a powerful, user-friendly, full-featured set of tools that will aid you in graphically displaying your information.
- EViews graphing menu is extensive.
- This tutorial focuses primarily on basic graphing in EViews.

Types of Graphs in EViews

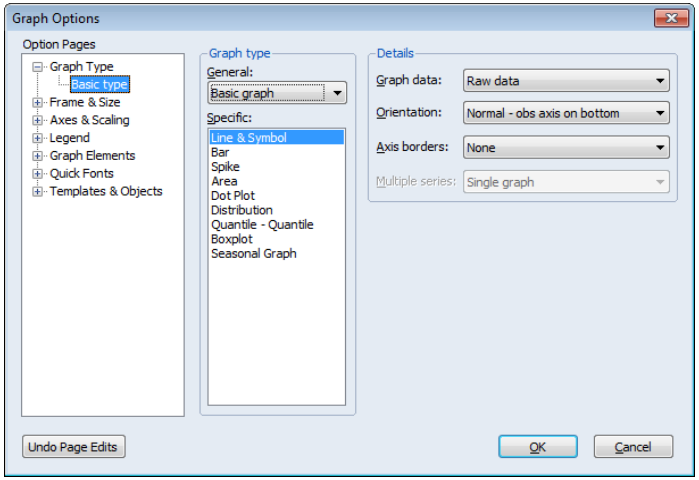
- EViews graph types can be grouped into four categories, i.e.:
  - ✓ ***Observation graphs*** – show data for each observation in the series or group (covered in this tutorial).
  - ✓ ***Analytical Graphs*** – show results obtained from analysis of the series or group data (not covered in this tutorial, see *User Guide*).
  - ✓ ***Auxiliary Graphs*** – show analytical graphs deriving from a modification of observation graphs (i.e., regression line or kernel fit line: not covered in this tutorial, see *User Guide*).
  - ✓ ***Categorical Graphs*** – observation or analytical graphs created by dividing data into categories defined by factors (not covered in this tutorial, see *User Guide*).

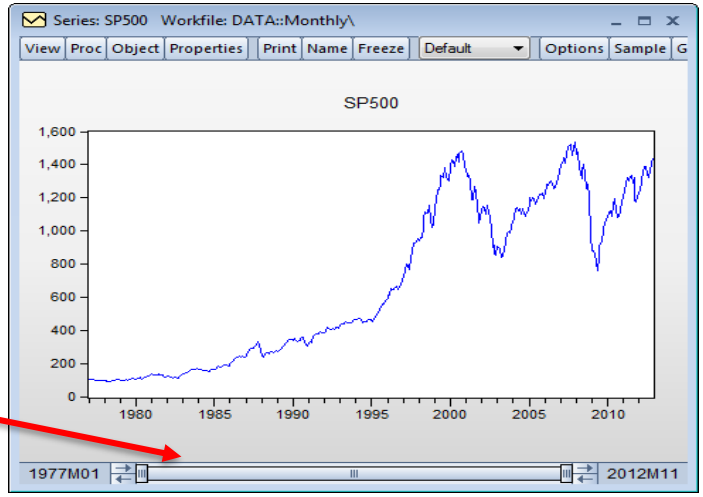
Creating a Graph

- The easiest way to create a graph in EViews is by ***View*** ⟶ ***Graph*** menu.

Creating a simple graph:

1. Open a suitable data object on workfile page (e.g. series, matrix, group, etc.).
2. Click ***View*** → ***Graph***.
3. This brings up the ***Graph Options*** dialog box. Under ***Option Pages*** select ***Basic type*** page.
4. Under the ***Graph type*** section, select ***Basic graph*** from the ***General*** category.
5. Select ***Line & Symbol*** from the ***Specific category***. Alternatively, one can select any other of the presented options.
6. Leave ***Details*** settings as specified by default options (and as shown here).





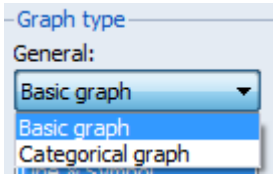
Sample Slider Bar

Graph Options Menu (Part I)

- **Graph Type:** this specifies the type of graph you wish to display. It has two categories: (i) ***General*** and (ii) ***Specific***.

✓**General** – offers two options:

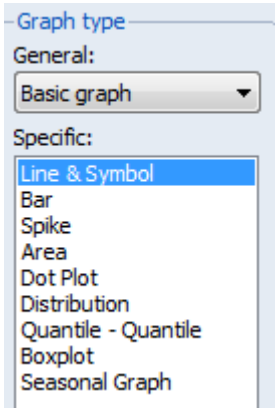
- **Basic graph**: shows basic graph.
- **Categorical graph:** shows data divided into categories defined by factor variables (see Advanced Graphing tutorial for details).



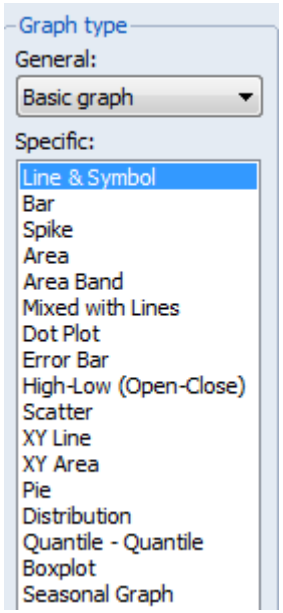
✓**Specific**: offers a list of the graph types available for use.

<u>Note:</u> There are different options available for series and groups.

<u>Series</u>



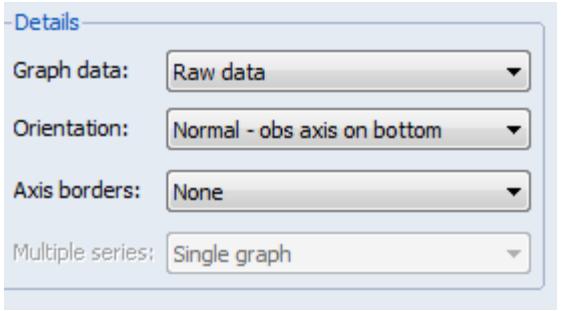
<u>Groups</u>



Graph Options Menu (Part II)

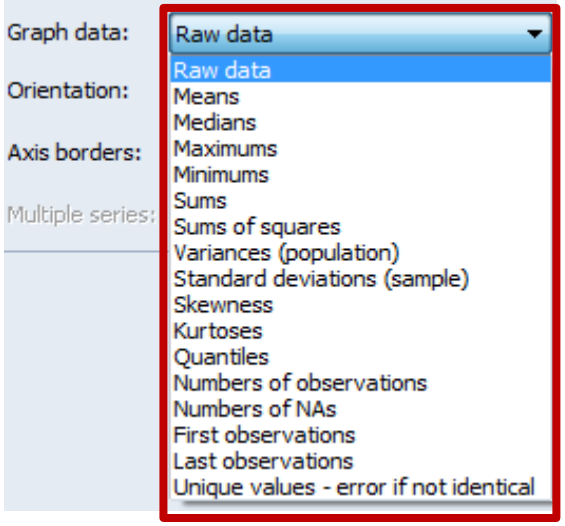
✓**Details:** this category specifies additional details, such as:

- Graph Data
- Orientation
- Axis Borders
- Multiple Series



✓**Graph Data:** it specifies the data to be used in observation graphs

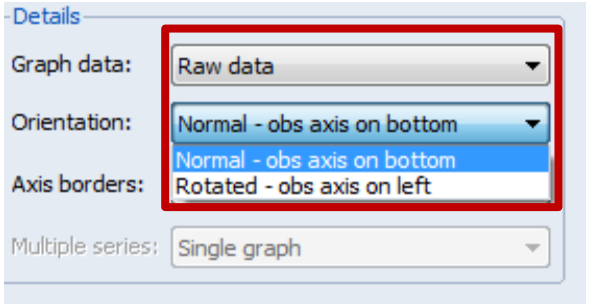
- ***Raw data*** – is the default setting. Every observation is plotted.
- ***Summary Statistics*** – allows you to compute summary statistics (means, medians, etc).
  - For a single series, the summary statistics shows a single data point.
  - For single series, you may want to leave the setting at ***Raw data***.
  - The **Graph data** option is more useful with multiple series (Groups)

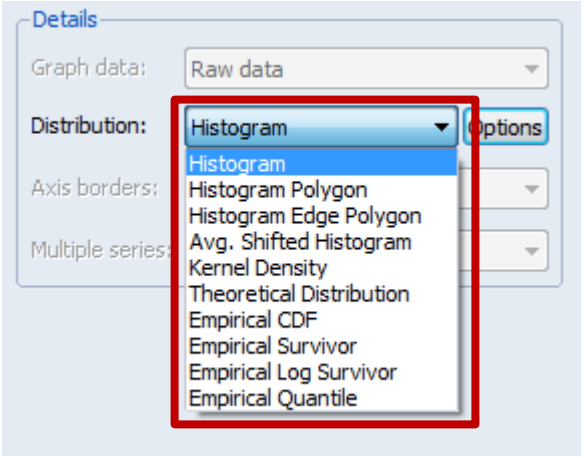


Graph Options Menu (Part III)

- ✓**Orientation** – it allows you to choose between two options:
  - ***Normal*** – observations are along the horizontal axis.
  - ***Rotated*** – observations are along the vertical axis.

Note: For the following three types of graph: **Distribution, Quantile-Quantile** and **Seasonal Graphs** different options appear instead of **Orientation**.

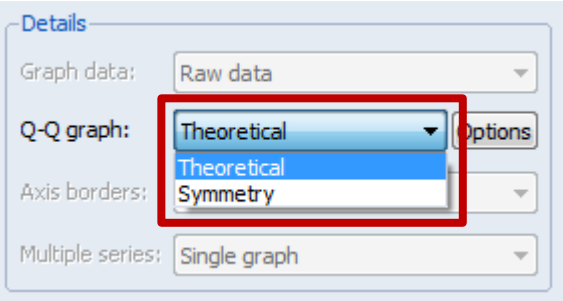




Graph Options Menu (Part IV)

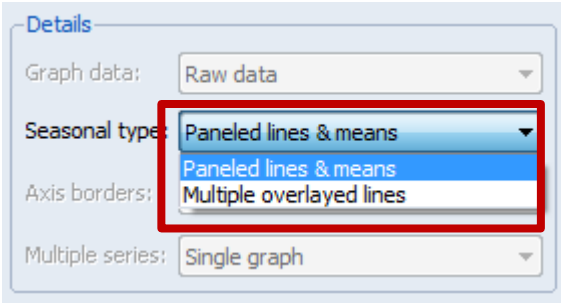
✓ ***Quantile-Quantile G***raphs

The **Orientation** option changes to Q-Q graph option with the drop-down menu shown here.



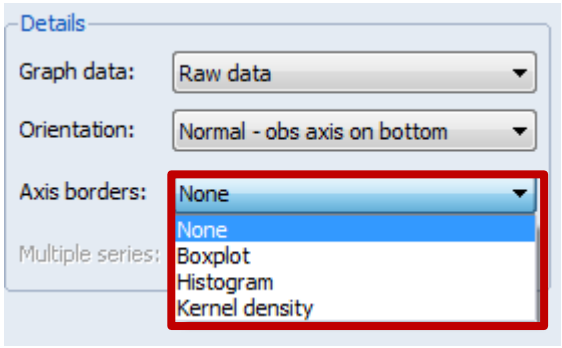
✓ ***Seasonal*** Graphs

The **Orientation** option changes to **Seasonal type** option with the drop-down menu shown here.

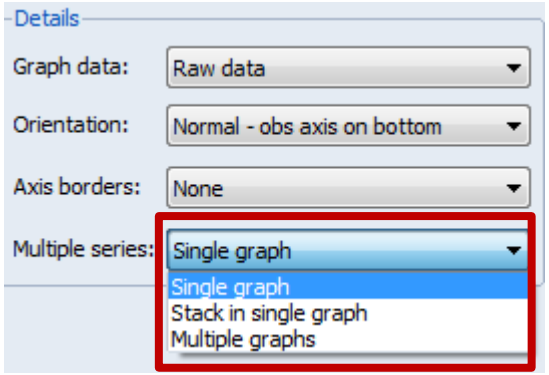


Graph Options Menu (Part V)

- ✓**Axis Borders** – allows you select a distribution graph to display along the axis of your graphs.
  - By default no axis are displayed (default ***None***).



- ✓**Multiple Series** – this allows you to handle multiple series (group data).
  - If you have a single series, this menu option is unavailable.
  - For multiple series, it shows the options displayed here which ask you to specify how you want to display your multiple-series.



Graph Objects

- When creating graphs by clicking on the **Graph** view from the **View** menu of a series or group, remember that what you create are simply *graph views*.
- These *graph views* are transitory: while you can customize them, once you close the series or group object, most of these settings will be lost.
- You may save a graph by ***freezing*** it (***FREEZE*** button). This creates a *graph object*. Freezing a view (graph object) creates a snapshot of the current graph view, allowing you to create permanent customization of the output.
  - ✓ Because a graph object created by turning off the **Auto Update Option** is divorced from underlying data series, the options for changing from one type of graph to another (categorical graphs, distribution plots, etc.) are limited.
  - ✓ It's best to select (and settle on) a graph type before freezing a graph if you intend to keep the auto-updating feature off.
- Frozen graphs have two main advantages:
  - ✓ Customizations are stored as part of the graph object so they do not disappear.
  - ✓ You can choose whether the graph will update every time the data/sample change.

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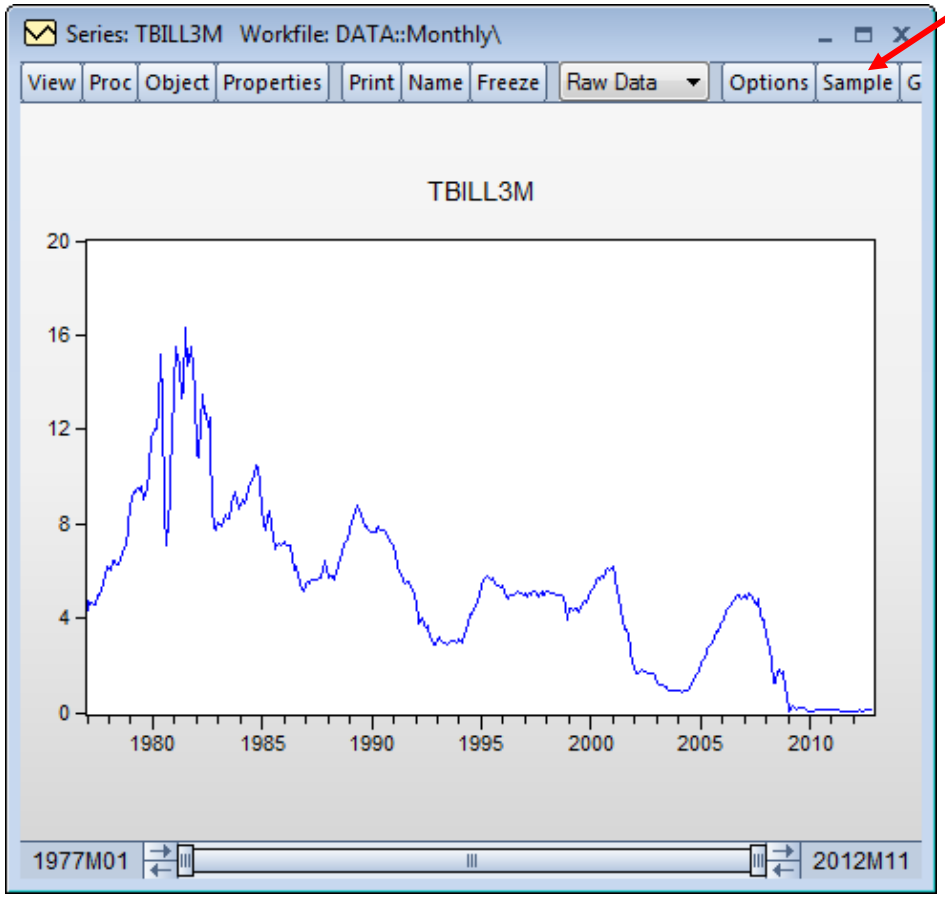
BASIC GRAPHING: SERIES

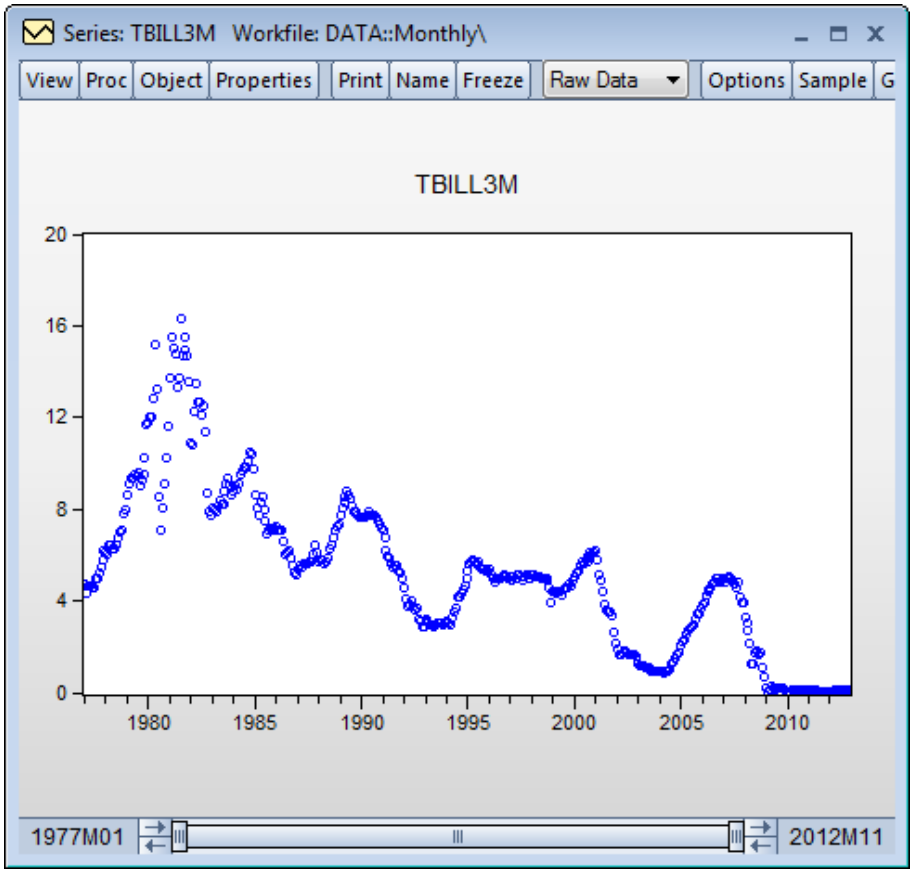
Selected Single Series Graphs (Part I)



The sample / IF conditions can be specified.

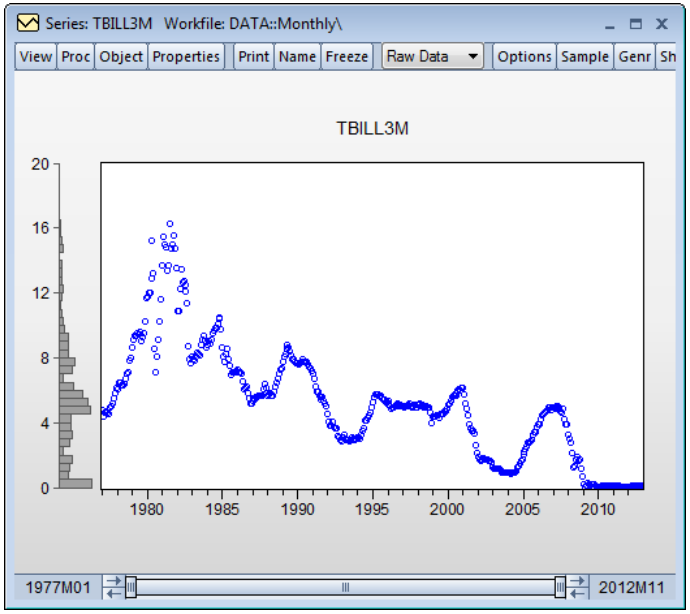
Basic line graph
(using default graphing settings)

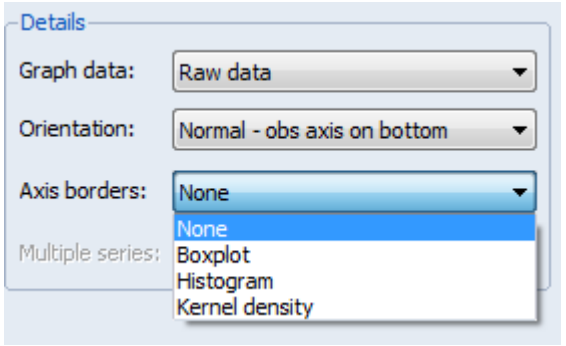
Selected Single Series Graphs (Part II)



Basic dot plot
(using default graphing settings: a symbol-only version of the *Line & Symbol* graph)

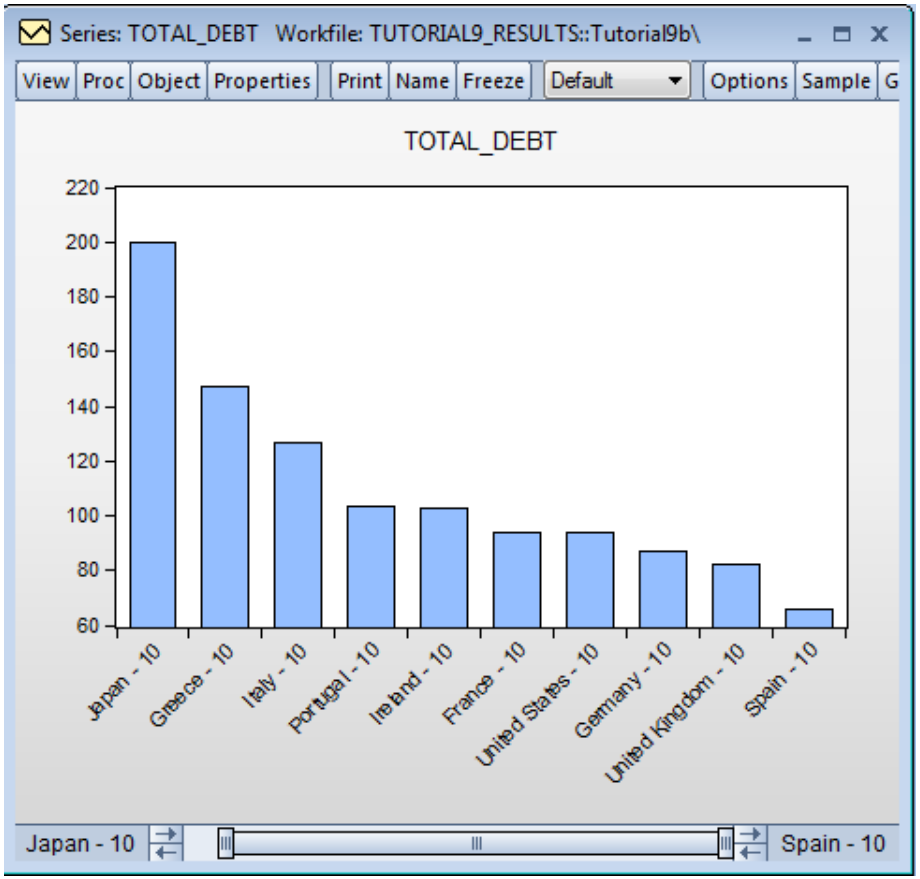
Selected Single Series Graphs (Part III)





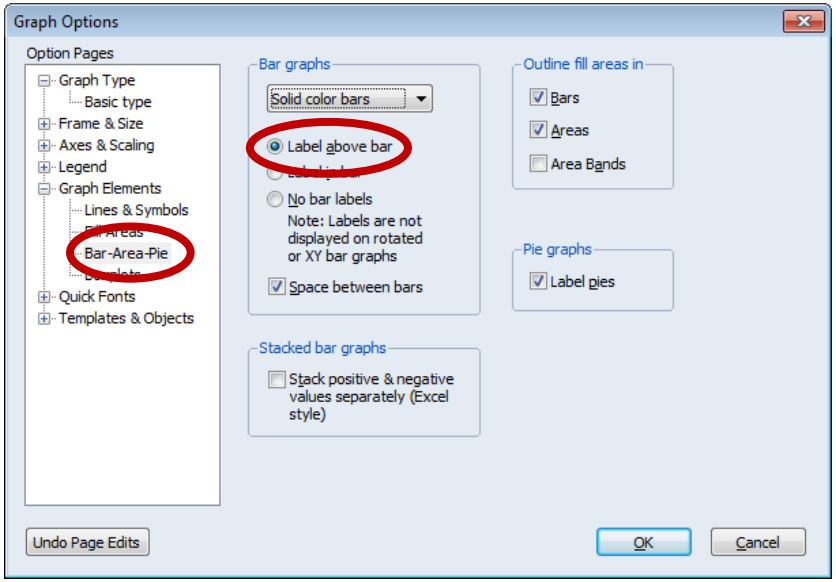
Basic dot plot
(using default graphing settings: a symbol-only version) with histogram as an axis border

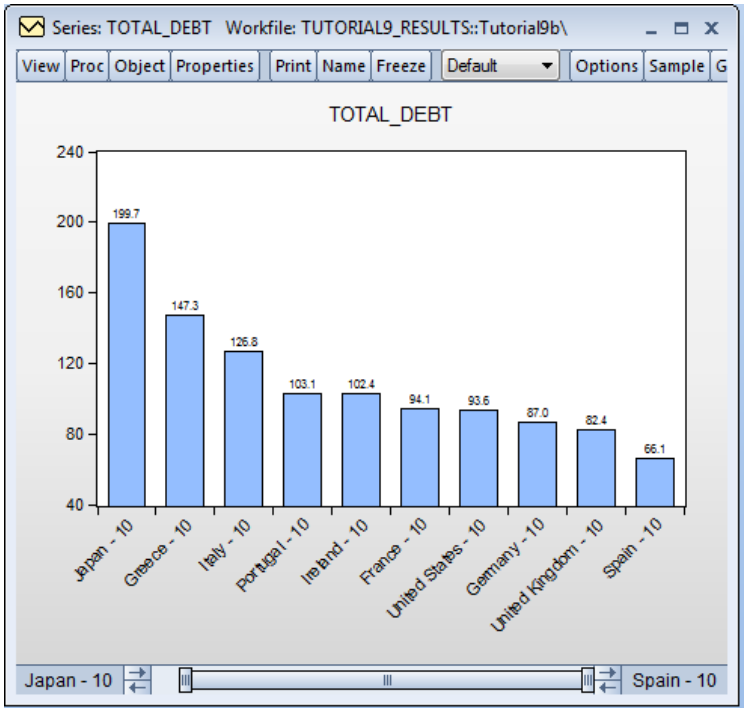
Selected Single Series Graphs (Part IV)



Bar plot
(using default graphing settings with *Bar* selected from *Graph type/Specific*)

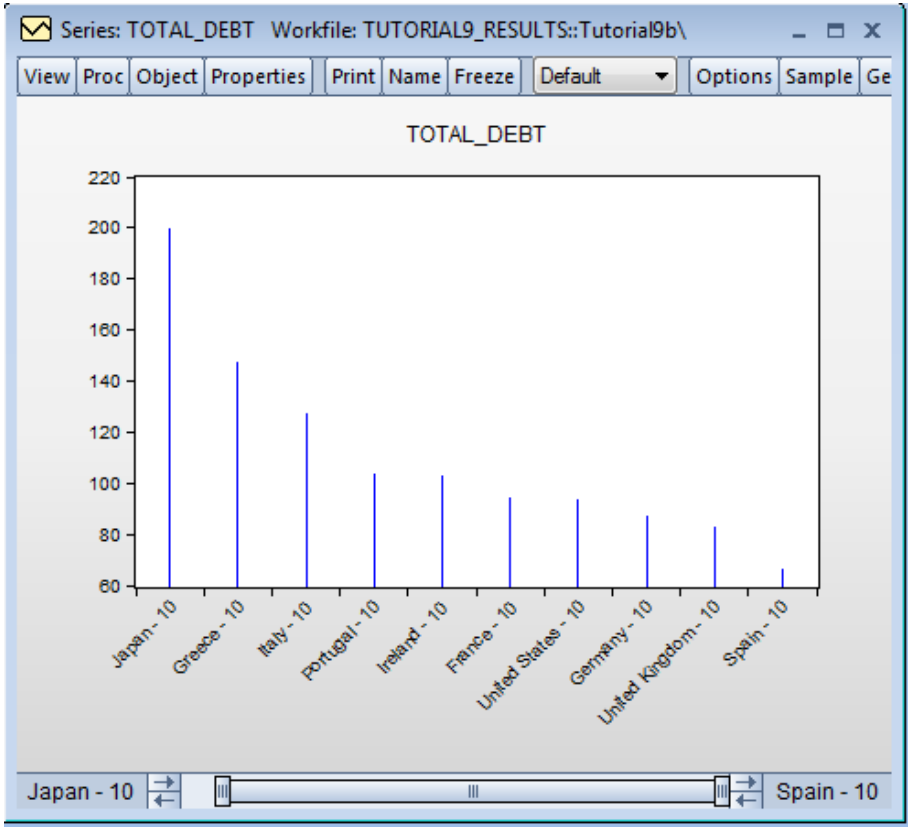
Selected Single Series Graphs (Part V)





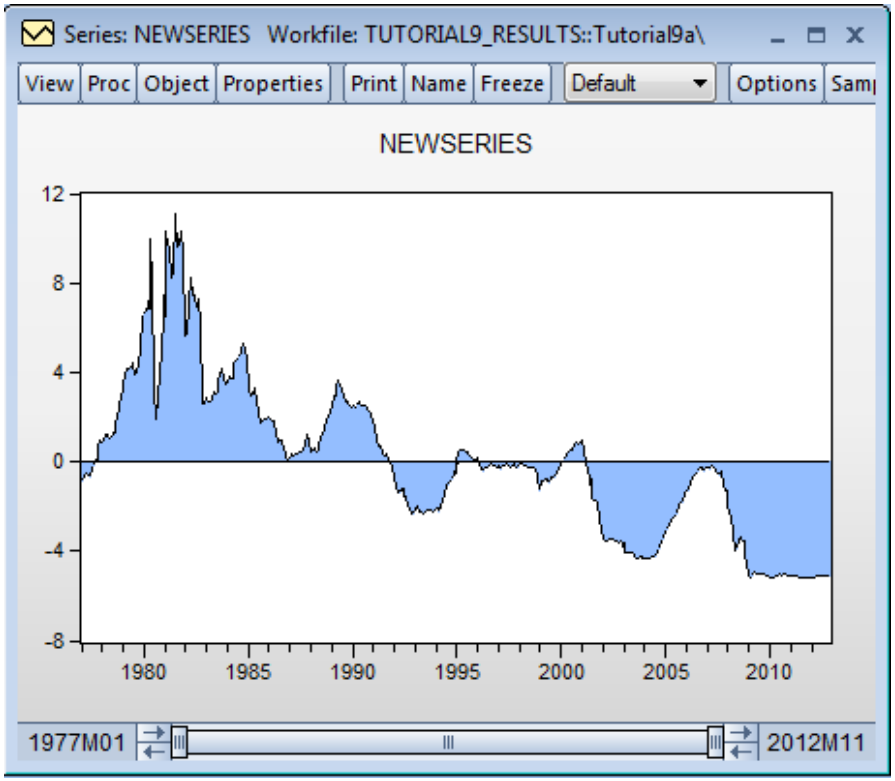
Bar plot with numerical value labels

Selected Single Series Graphs (Part VI)



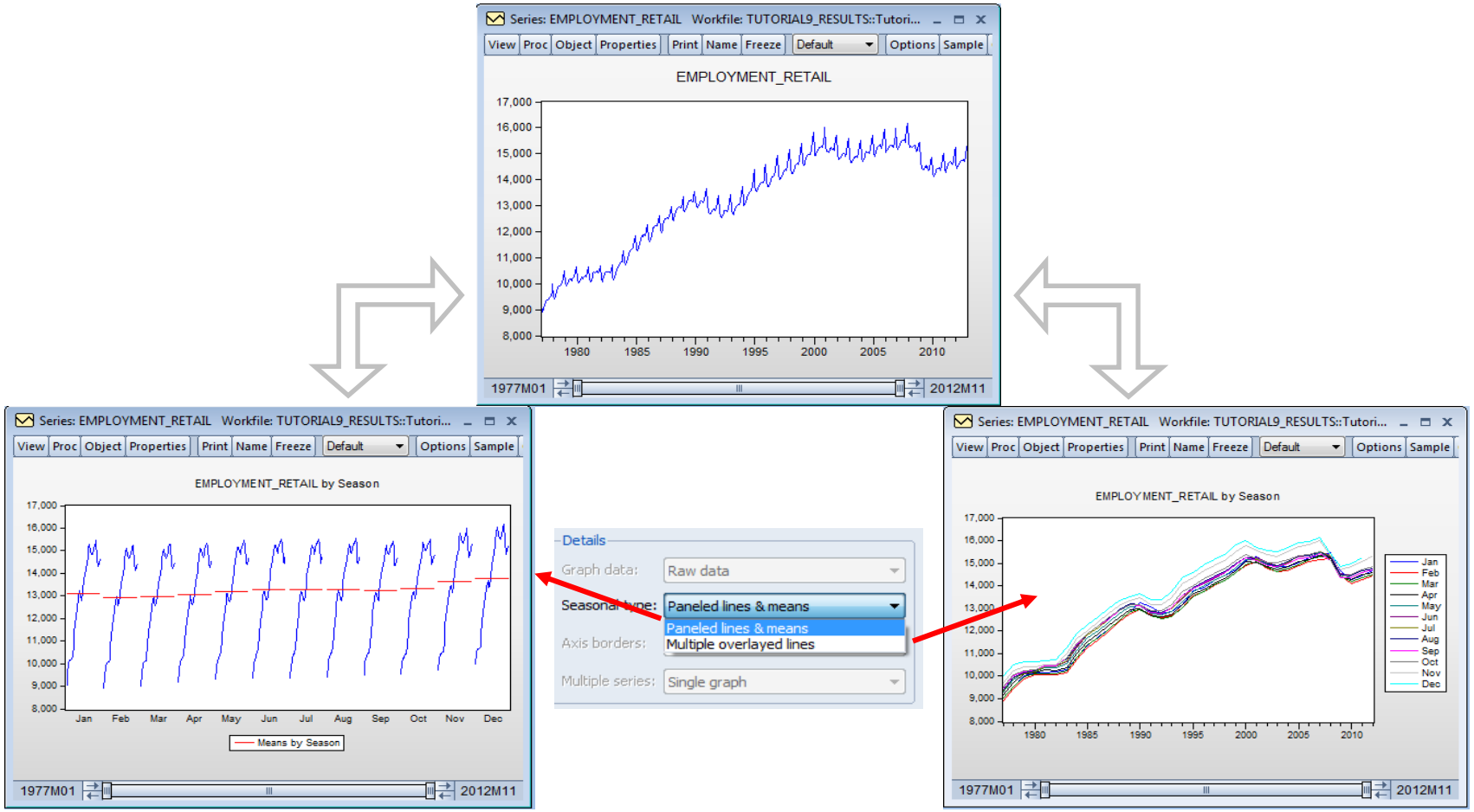
Spike plot
(using default graphing settings with *Spike* selected from *Graph type/Specific*)

Selected Single Series Graphs (Part VII)



Area plot
(using default graphing settings with *Area* selected from *Graph type/Specific*)

Selected Single Series Graphs (Part VIII)



Line & Seasonal plots

(one line & two seasonal plots - *Seasonal* selected from *Graph type/Specific* + defined by *Seasonal type*)

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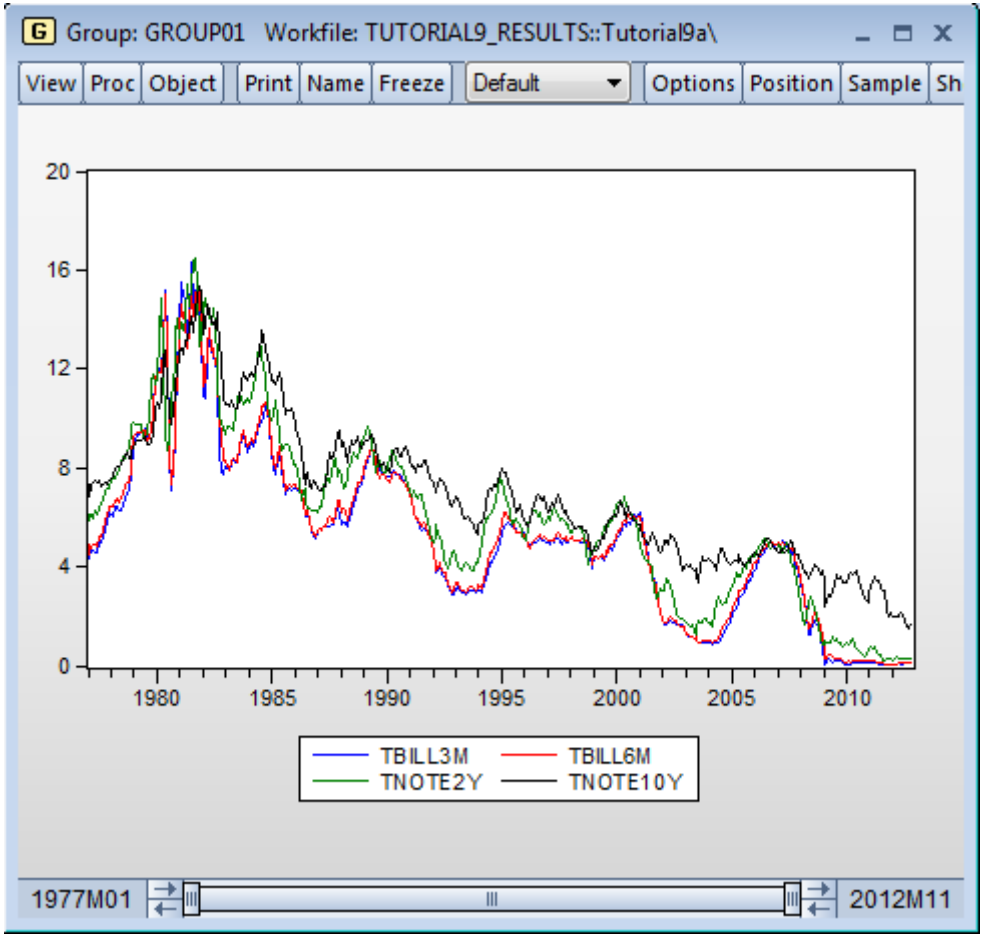
BASIC GRAPHING: GROUPS

Multiple Series Graphs

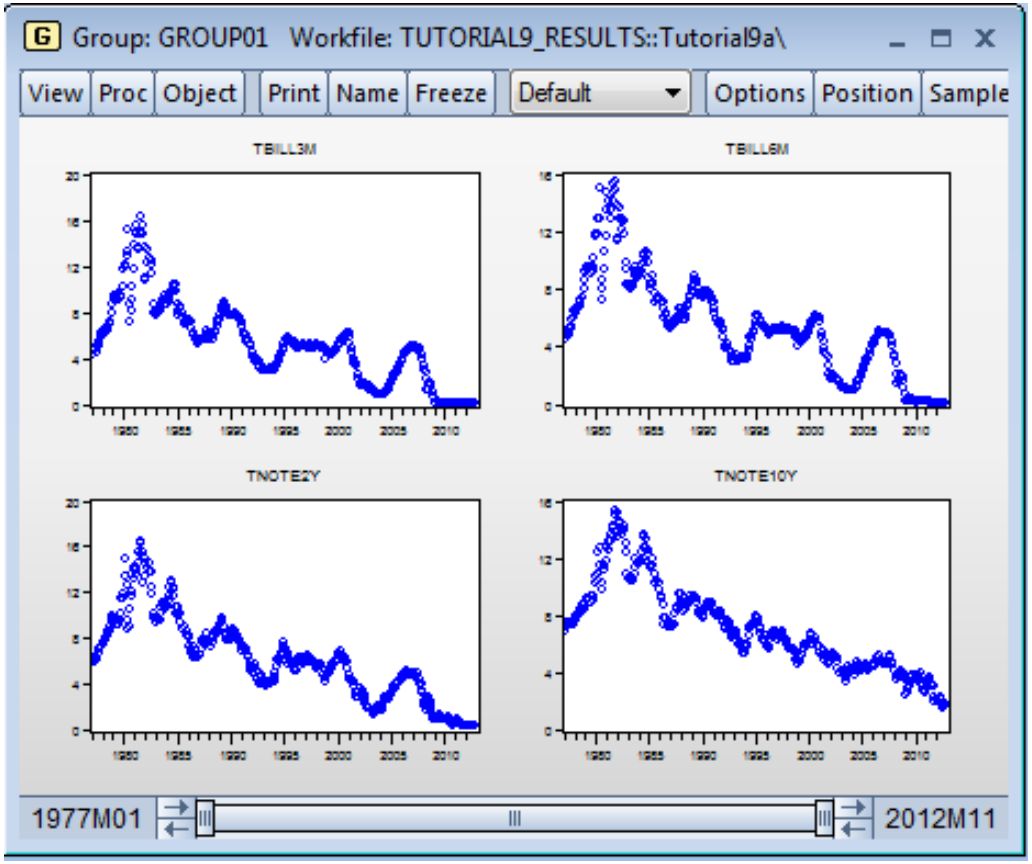
- If you open a group of series, the following graph types appear:
  - ✓ Line & Symbol
  - ✓ Bar
  - ✓ Spike
  - ✓ Area
  - ✓ Area Band
  - ✓ Mixed with Lines
  - ✓ Dot Plot
  - ✓ Error Bar
  - ✓ High-Low (Open-Close)
  - ✓ Scatter
  - ✓ XY Line
  - ✓ XY Area
  - ✓ XY Bar
  - ✓ Pie
  - ✓ Distribution
  - ✓ Quantile-Quantile
  - ✓ Boxplot
  - ✓ Seasonal Graph
- Here, we shall illustrate selected observation type graphs. All other graphs can be implemented in the same matters (see also *User Guide*).
- All types of graphs available for a single series are also available for graphing series in a group.

Selected Multiple Series Graphs (Part I)



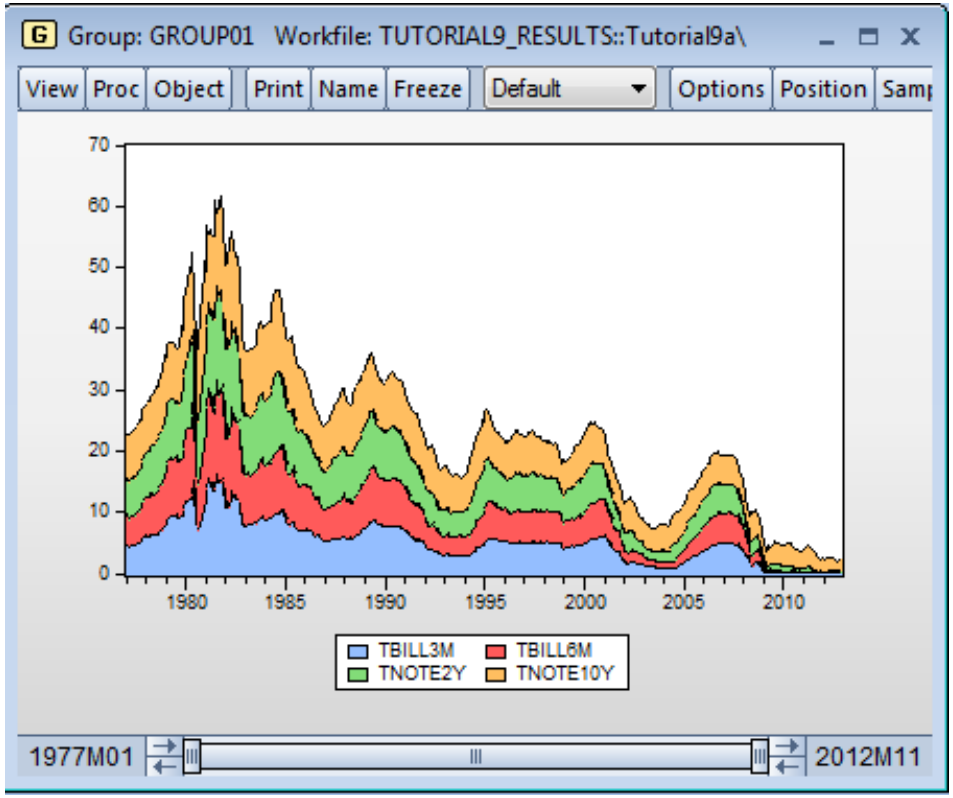
Basic line graph - one graph (selected in *Multiple series*)
(using default graphing settings)

Selected Multiple Series Graphs (Part II)



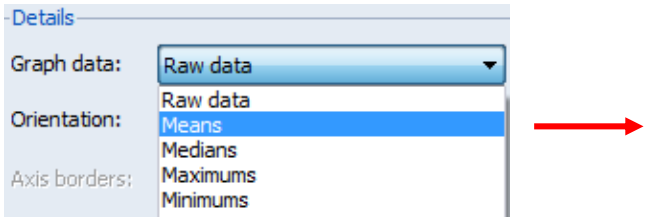
Basic dot graphs - multiple graphs (selected in *Multiple series*)
(using default graphing settings: a symbol-only version of the *Line & Symbol* graph)

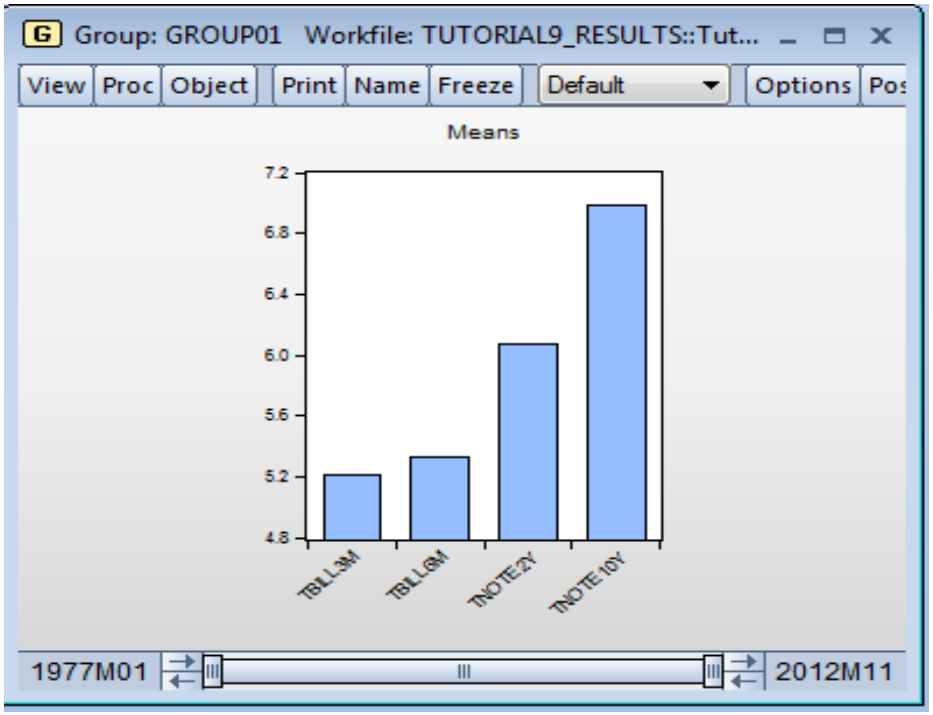
Selected Multiple Series Graphs (Part III)



Area plots – stack in one graph (selected in *Multiple series*)
(using default graphing settings with *Area* selected from *Graph type/Specific*)

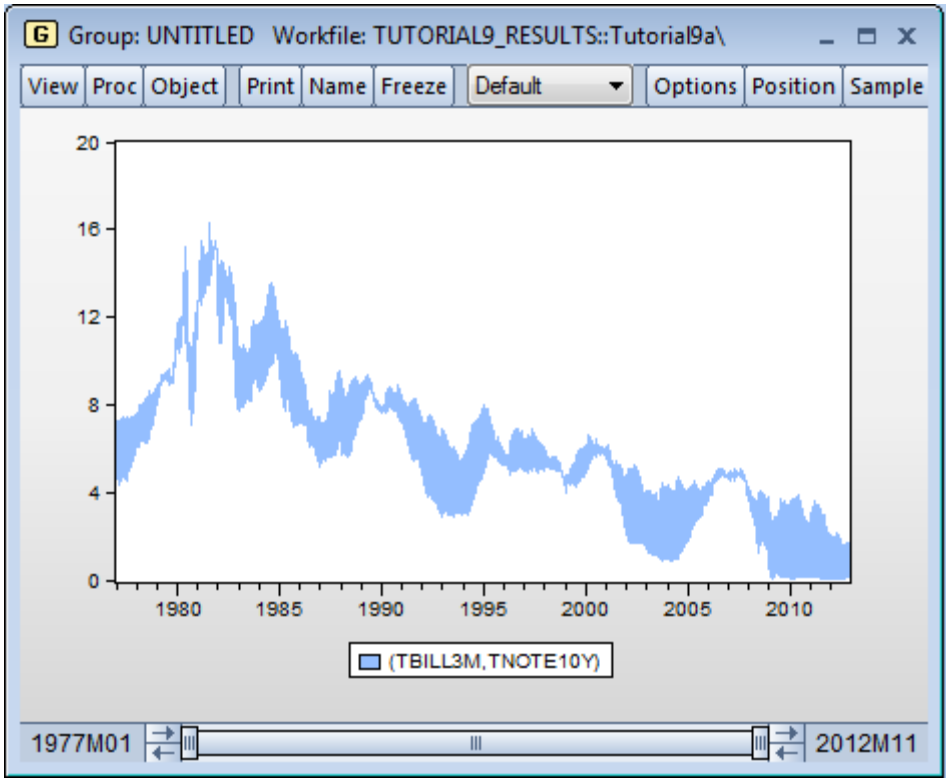
Selected Multiple Series Graphs (Part IV)





Bar plot of summary statistics (selected *Means* in *Graph data*)
(using default graphing settings with *Bar* selected from *Graph type/Specific*)

Selected Multiple Series Graphs (Part V)

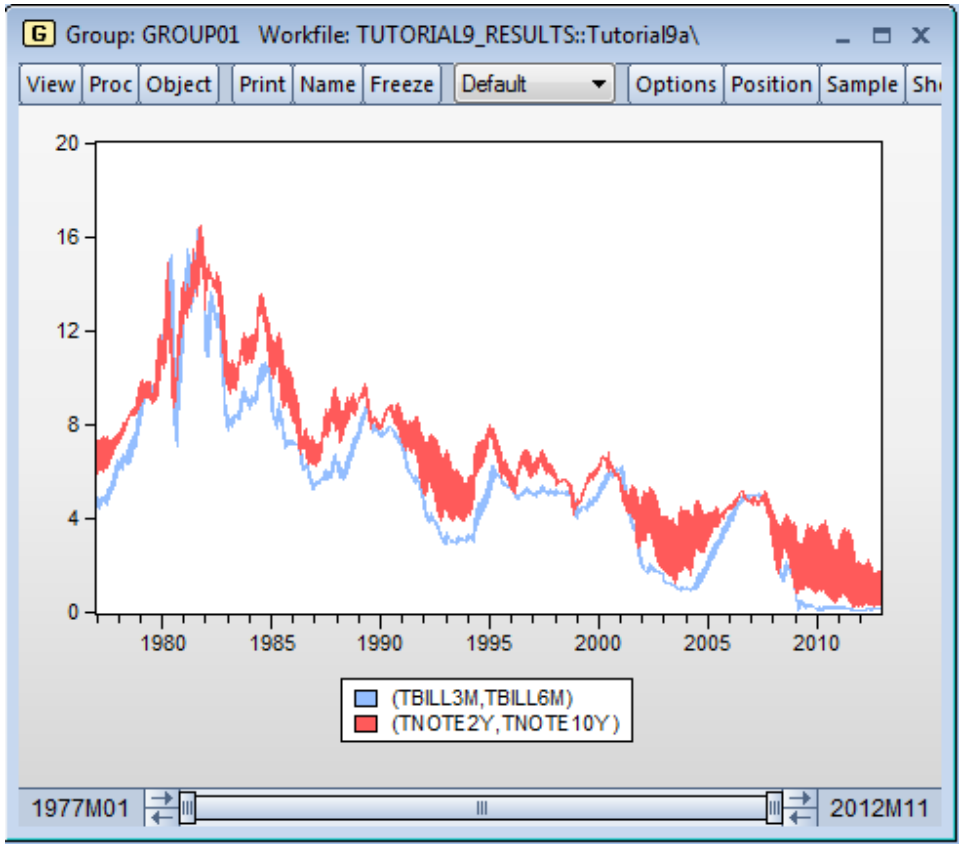


Area band plot of two series

(using default graphing settings with *Area Band* selected from *Graph type/Specific*)

Note: Area Bands plots a band using pairs of series by filling in the area between the two sets of values.

Selected Multiple Series Graphs (Part VI)

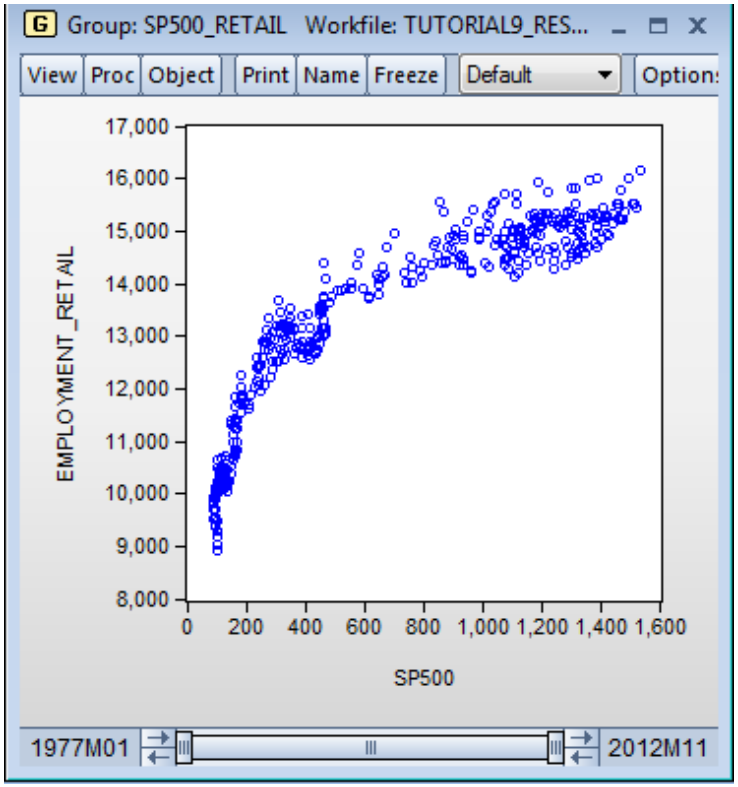


Area band plot of successive series in the group

(using default graphing settings with *Area Band* selected from *Graph type/Specific*)

Note: If you have an odd number of series in the group, then EViews plots the last series as a line (by default).

Selected Multiple Series Graphs (Part VII)



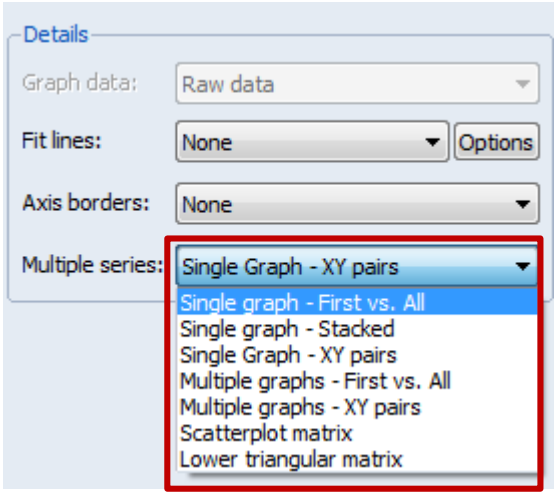
Scatter plot

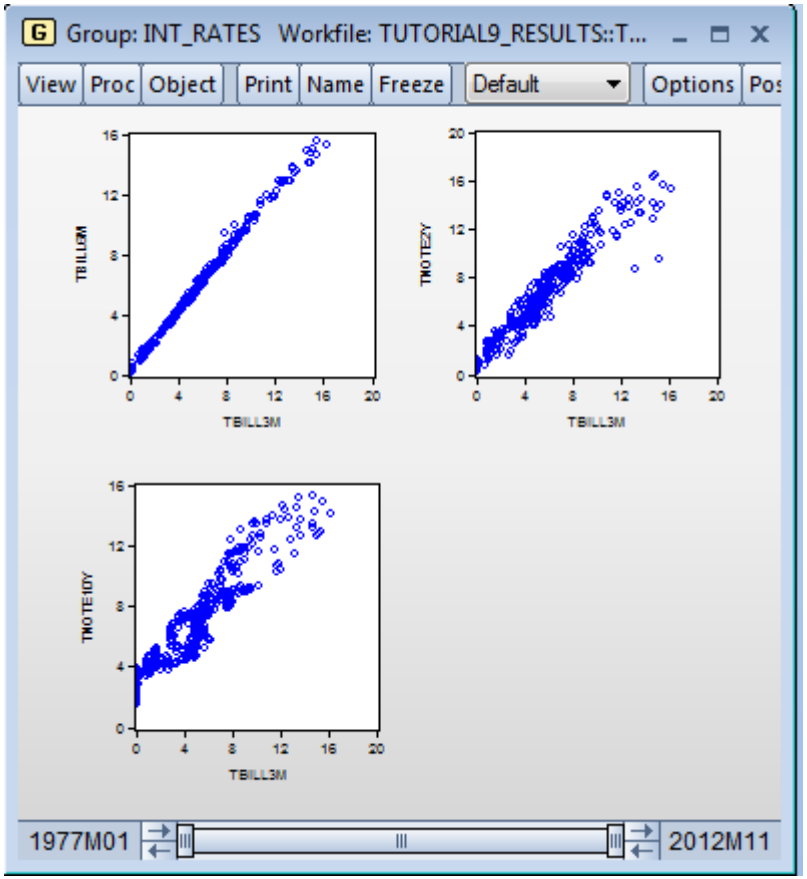
(using default graphing settings with *Scatter* selected from *Graph type/Specific*)

Note 1: Scatter Plots are used to visually examine the relationship between variables.

Note 2: XY Line/XY Area graphs are similar to scatterplots.

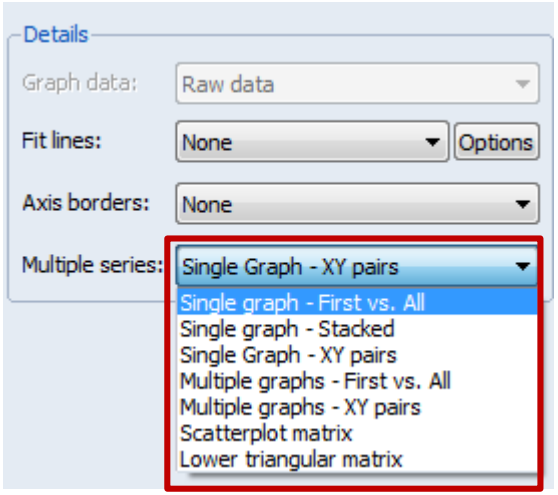
Selected Multiple Series Graphs (Part VIII)

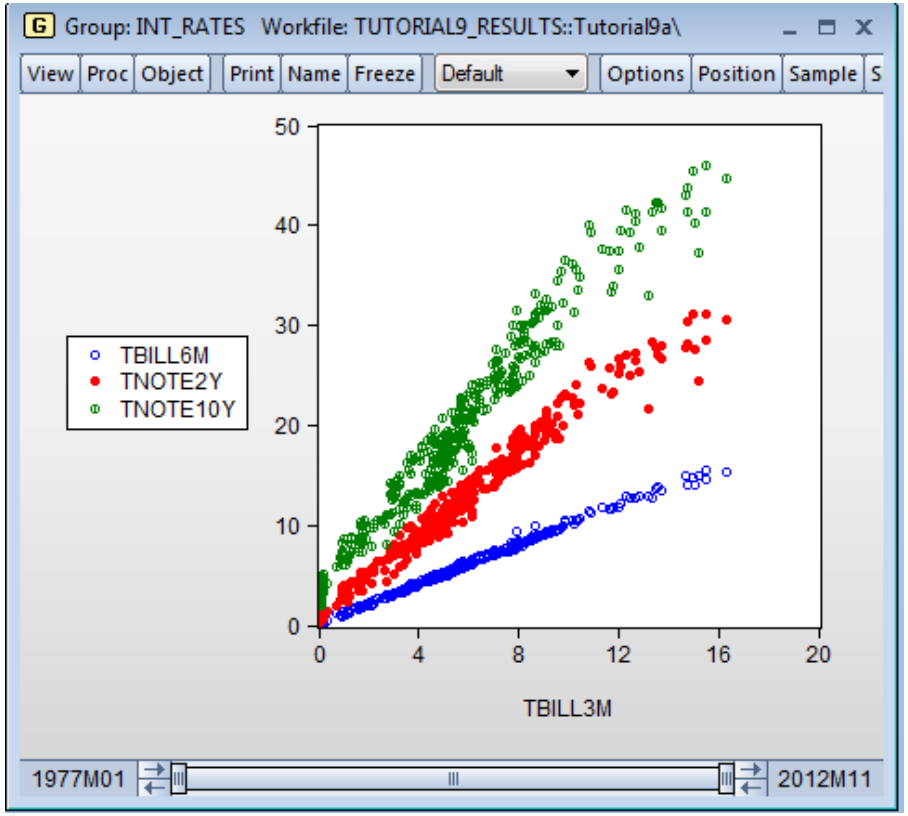




Scatter plot (*Single graph – First vs. All*)
(using default graphing settings with *Scatter* selected from *Graph type/Specific* and *Multiple series* options)
Note 1: Scatter Plots are used to visually examine the relationship between variables.
Note 2: XY Line/XY Area graphs are similar to scatterplots.

Selected Multiple Series Graphs (Part IX)





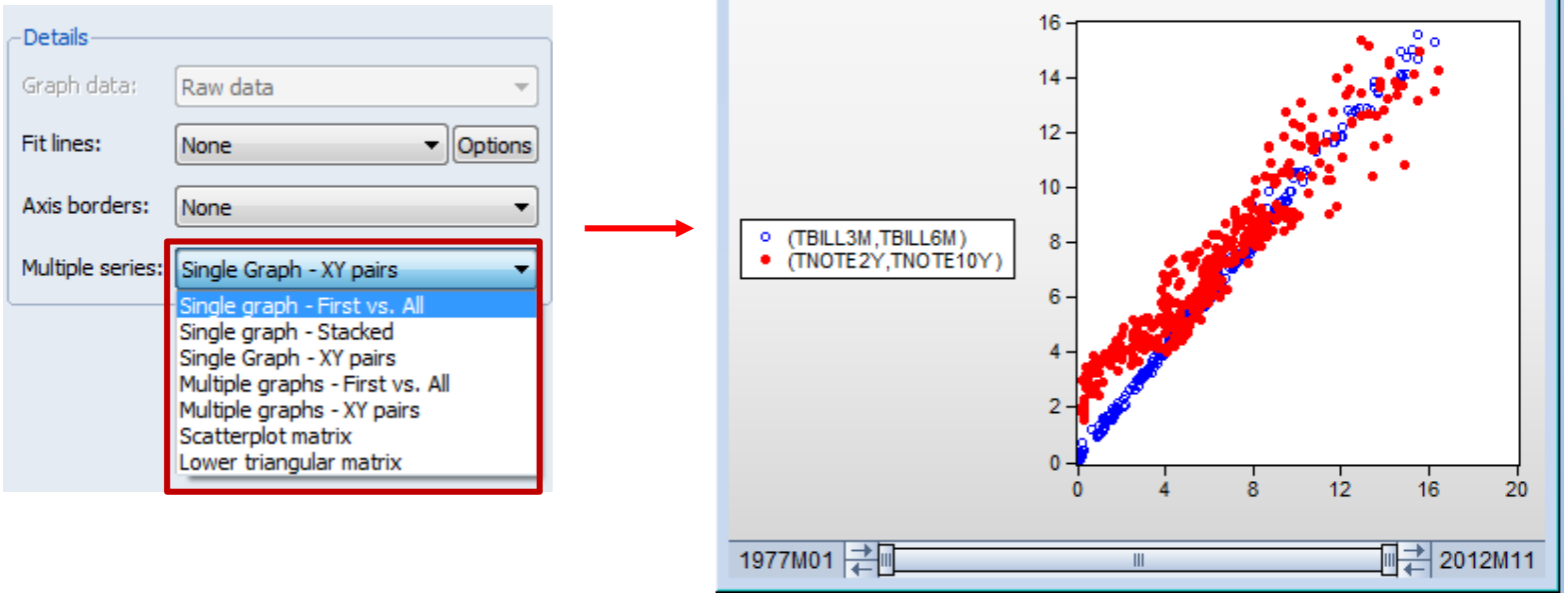
Scatter plot (*Single graph – Stacked*)

(using default graphing settings with *Scatter* selected from *Graph type/Specific* and *Multiple series* options)

Note 1: Scatter Plots are used to visually examine the relationship between variables.

Note 2: XY Line/XY Area graphs are similar to scatterplots.

Selected Multiple Series Graphs (Part X)



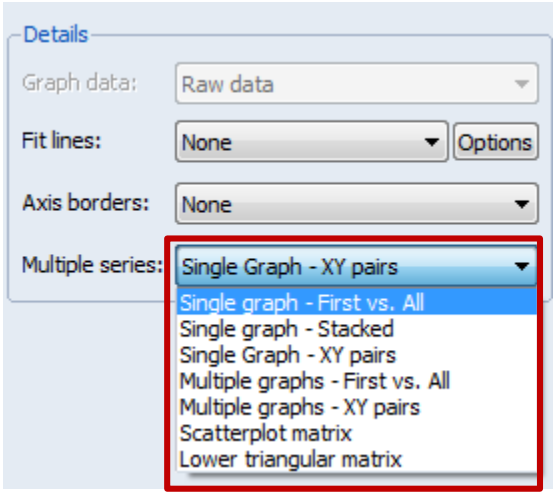
Scatter plot (*Single graph – XY Pairs*)

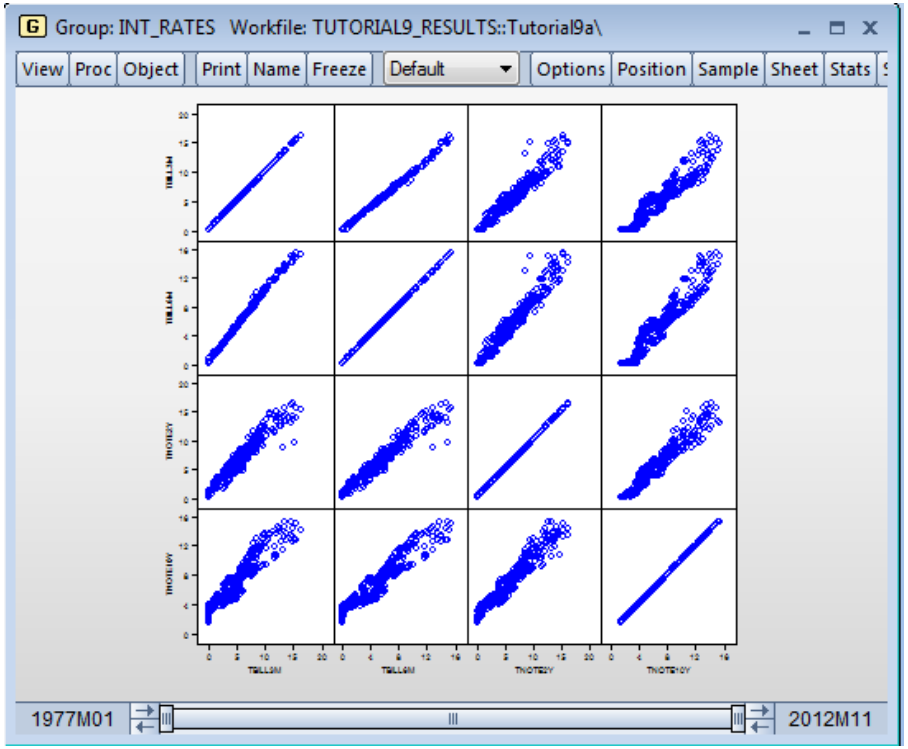
(using default graphing settings with *Scatter* selected from *Graph type/Specific* and *Multiple series* options)

Note 1: Scatter Plots are used to visually examine the relationship between variables.

Note 2: XY Line/XY Area graphs are similar to scatterplots.

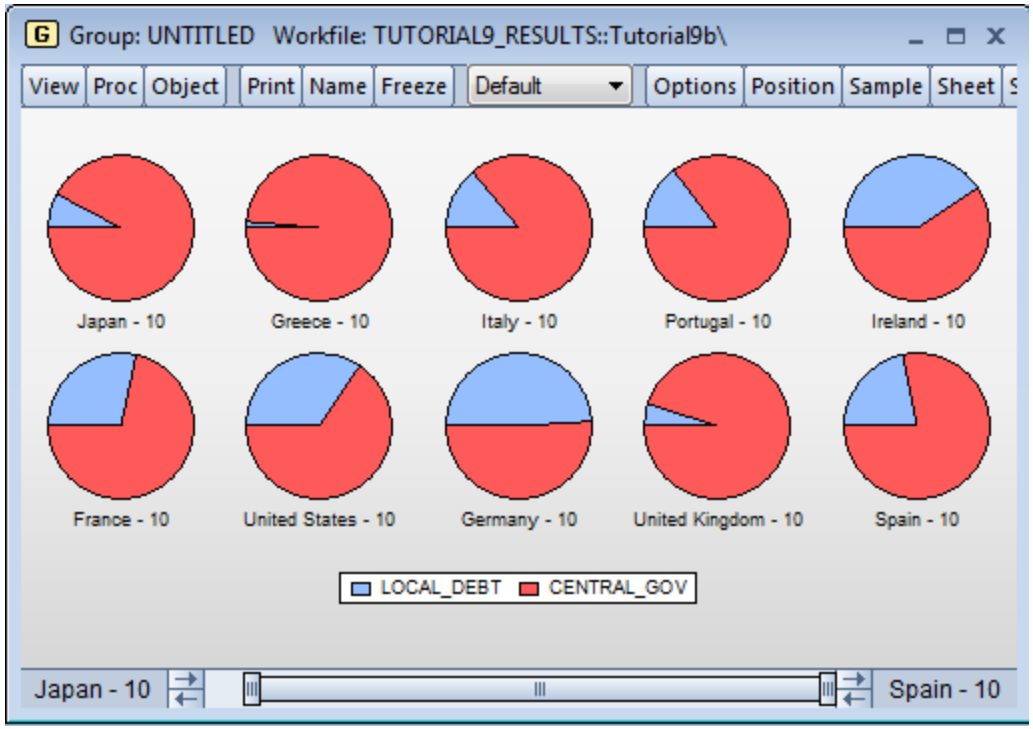
Selected Multiple Series Graphs (Part XI)





Scatter plot (*Single graph – Scatterplot matrix*)
(using default graphing settings with *Scatter* selected from *Graph type/Specific* and *Multiple series* options)
Note 1: Scatter Plots are used to visually examine the relationship between variables.
Note 2: XY Line/XY Area graphs are similar to scatterplots.

Selected Multiple Series Graphs (Part XII)



Pie chart

(using default graphing settings with *Pie chart* selected from *Graph type/Specific*)

Note: Pie charts are only available for multiple series.

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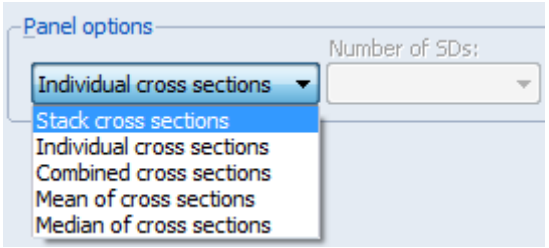
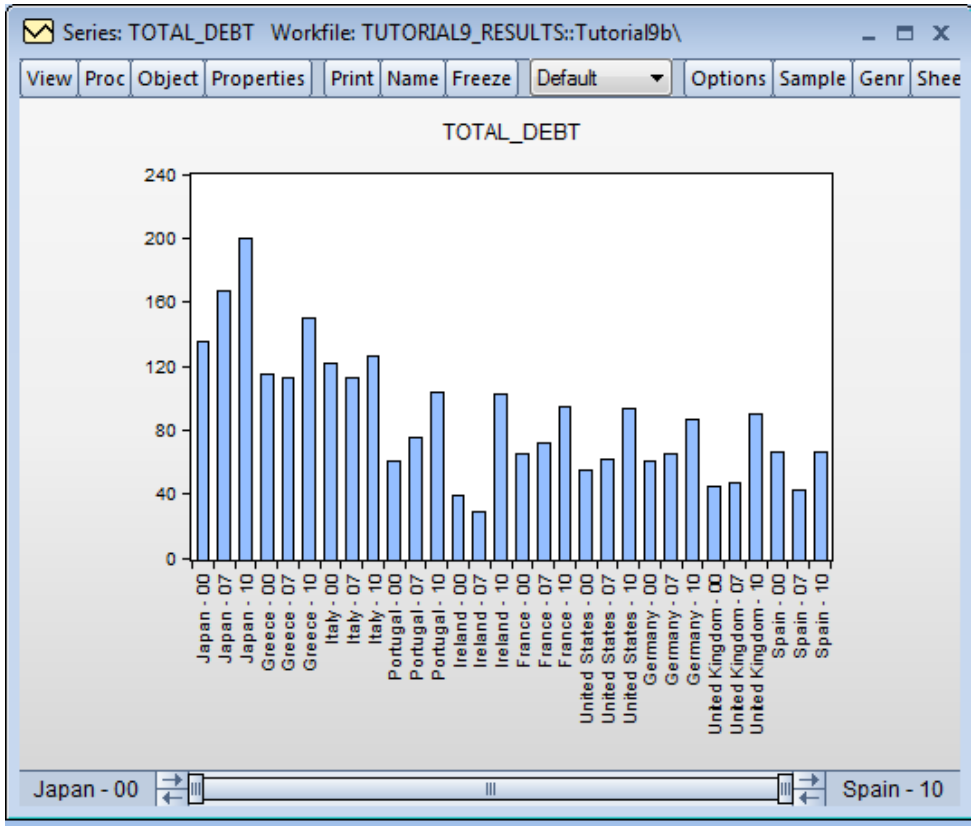
BASIC GRAPHING: PANEL DATA

Panel Graphs

- EViews offers a number of options when plotting graphs of panel data.
- If you want to plot a series with panel data structure, the following ***Panel Options*** appear:
  - ✓ Stack cross sections
  - ✓ Individual cross sections
  - ✓ Combined cross sections
  - ✓ Mean of cross sections
  - ✓ Median of cross sections



Selected Panel Graphs (Part I)

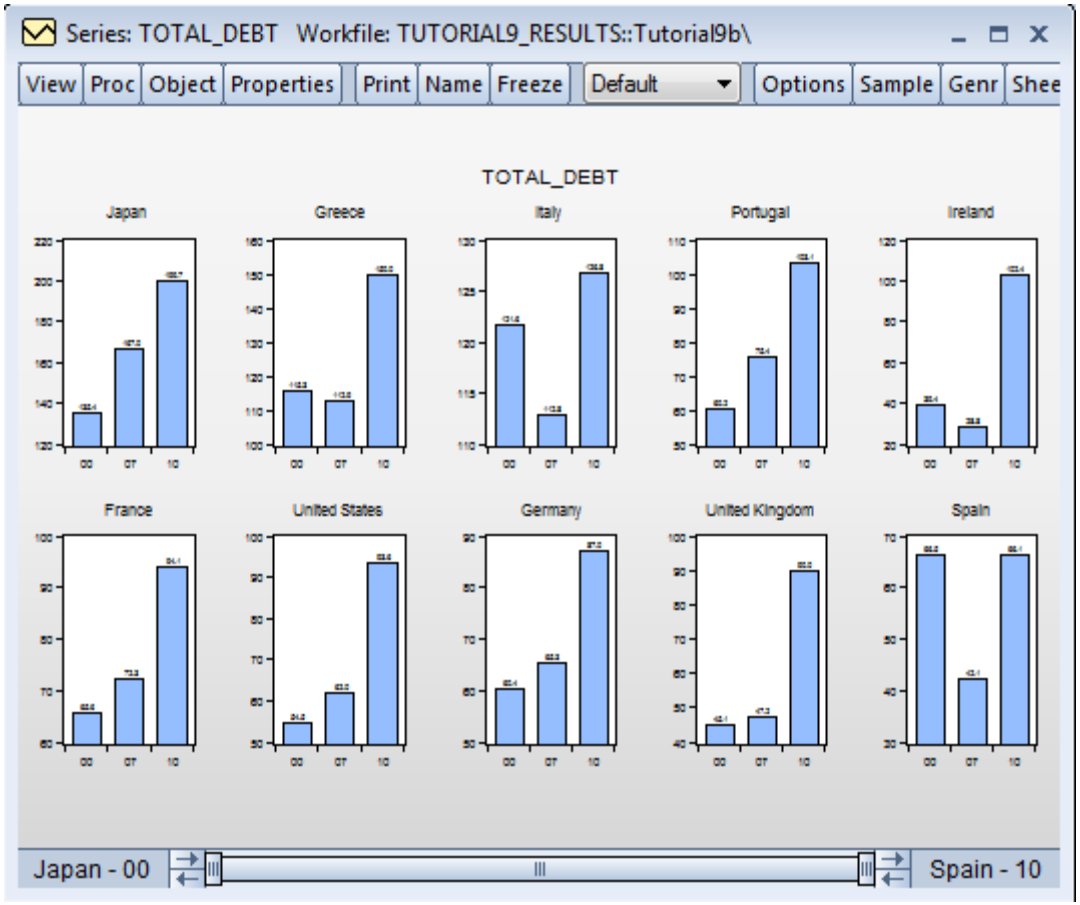


Panel data plot (*Stack Cross Section*)

(using default graphing settings with *Bar* selected from *Graph type/Specific*)

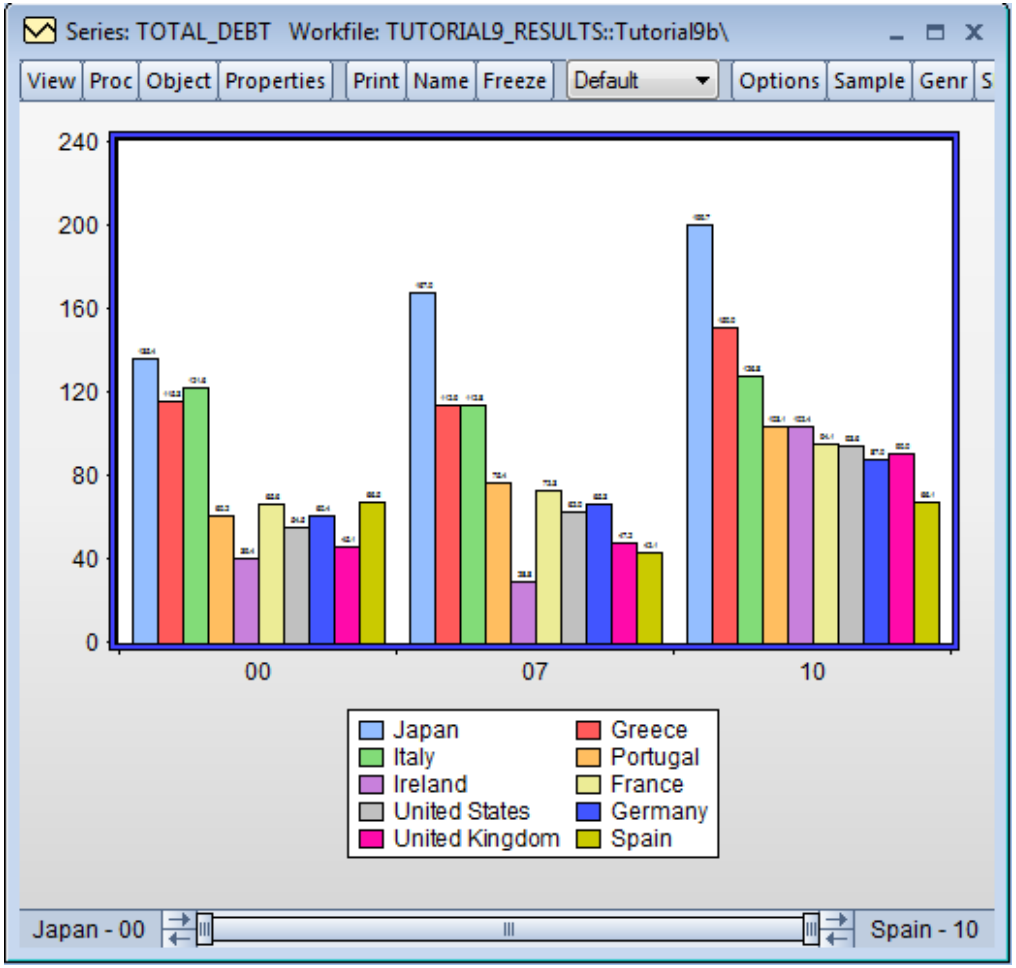
Note: The Stack Cross Section option simply stacks the data for each cross section and plots the data without regard for the structure.

Selected Panel Graphs (Part II)



Panel data plot (*Individual Cross Section*)
(using default graphing settings with *Bar* selected from *Graph type/Specific*)

Selected Panel Graphs (Part III)



Panel data plot (*Combined Cross Section*)
(using default graphing settings with *Bar* selected from *Graph type/Specific*)

EViews: Introductory User Guide

STATISTICAL ANALYSIS: BASICS

Basic Data Analysis: Notes

- Data analysis is one the most basic but important tasks when working with series and groups of series.
- EViews offers a toolkit for data analysis, which include descriptive statistics, statistical graphs, tests and procedures.
- Most of the data analysis functions discussed in this tutorial can be found in the ***View*** and ***Proc*** menu items.
- The main topics of this tutorial are:
  - Series
    - ✓ General Statistics
    - ✓ Series tests
    - ✓ Time Series tests
    - ✓ Series ***Proc*** (generate series, resample, seasonal adjustment)
  - Groups
    - ✓ General Statistics
- This tutorial covers only *basic* statistical analysis. For more details, see *User Guide*.

EViews: Introductory User Guide

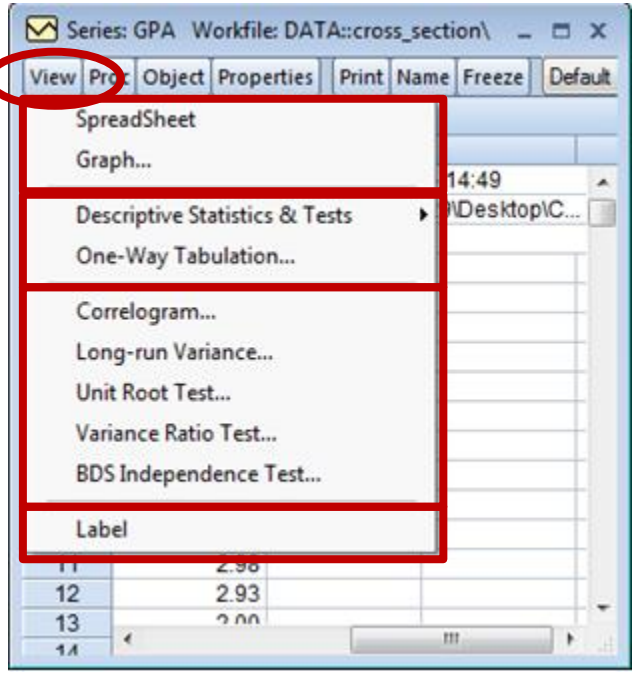
STATISTICAL ANALYSIS: SERIES

View Menu for Series

- The main data analysis item in EViews is the ***View*** menu.
- You can view all available actions for a series from this menu.

A drop-down ***View*** menu appears with a number of options grouped in 4 sections:

- ✓ The first section/block lists views that display the data series.
- ✓ The second bloc provides general statistics.
- ✓ The third block provides general statistics for time series.
- ✓ The fourth block allows to modify/display the series labels.



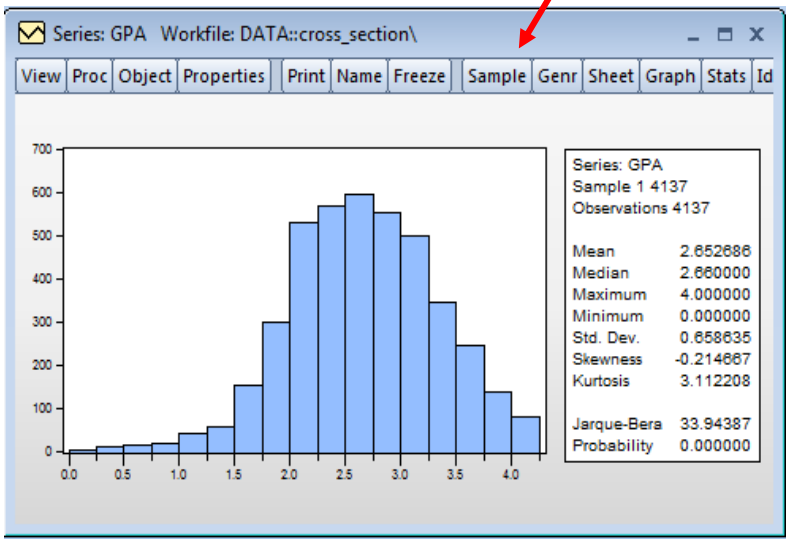
Descriptive Statistics: Histogram and Stats

- Basic statistical summaries (including histograms) can be found under the ***View → Descriptive Statistics & Tests → Histogram and Stats***.

General notes:

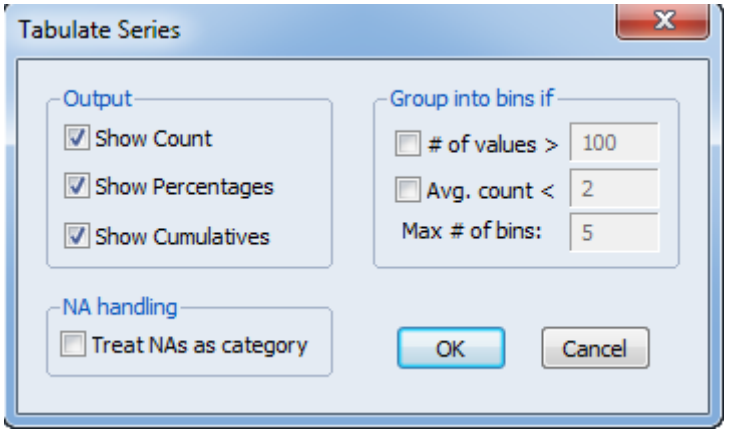
- ✓ The top of the statistics panel shows the name of the series, the sample, and the number of observations.
- ✓ In the middle of the statistics panel, EViews summarizes the main statistics for the GPA series (*note:* skewness measures the degree of asymmetry in data, whereas kurtosis measures the presence of "fat tails").
- ✓ The bottom of the panel shows the *Jarque-Bera* statistic and its associated probability and tests whether the data is drawn from a normal distribution. Since here, the p-value is 0.000, it is extremely unlikely that the data follows a normal distribution.

The sample / IF conditions can be specified.



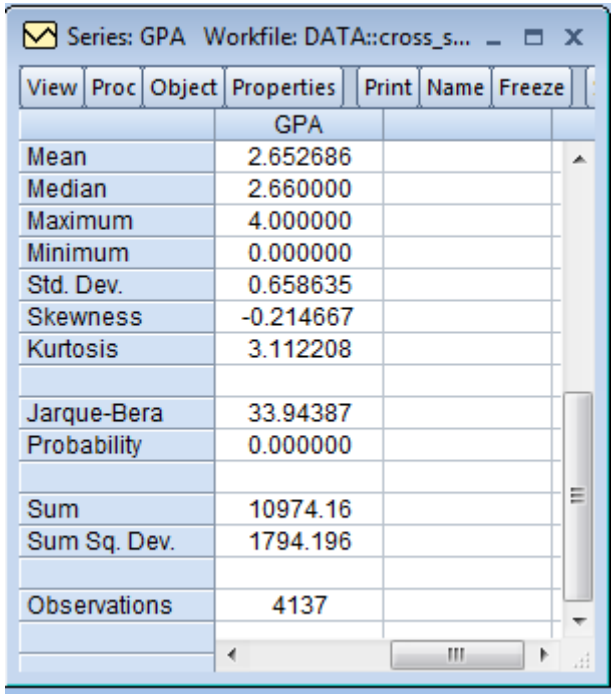
Descriptive Statistics: One-Way Tabulation

- If you want to see the entire distribution of the data, you can do so by using ***View → One-Way Tabulation***.
- EViews provides the counts, percentage counts and cumulative counts for each observation value.



Descriptive Statistics: Stats Table

- The ***View → Descriptive Statistics & Tests → Stats Table*** view displays descriptive statistics for the series in a tabular form.
- This information is pretty much the same as the statistics panel in the Histogram.

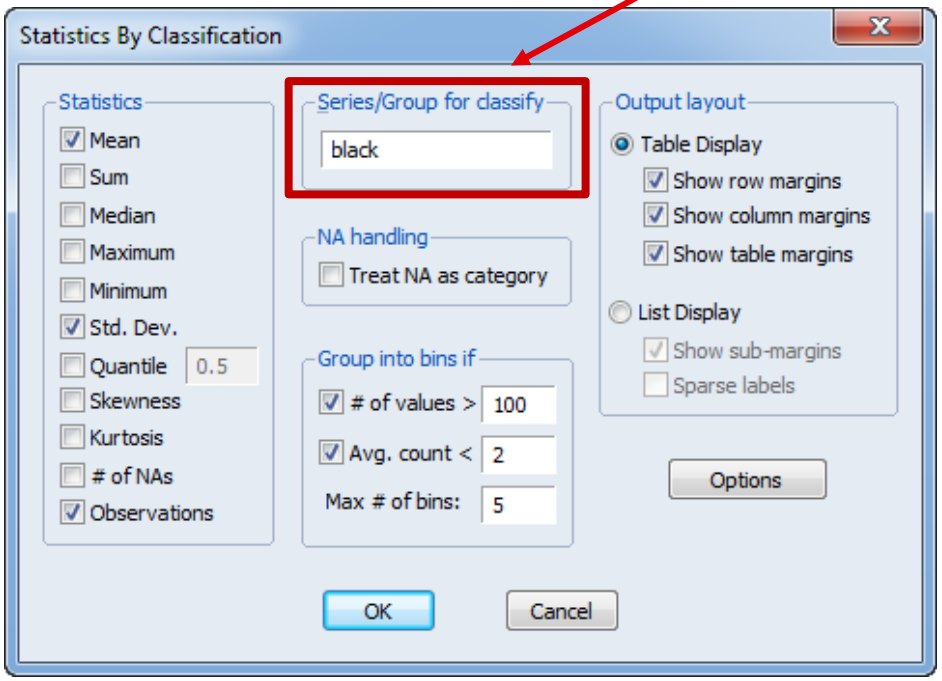


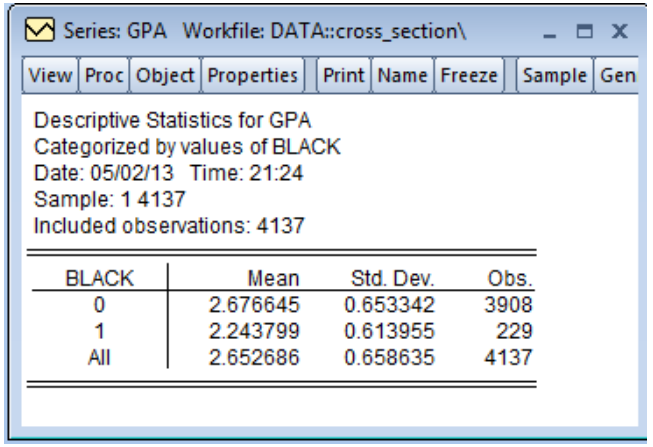
	GPA
Mean	2.652686
Median	2.660000
Maximum	4.000000
Minimum	0.000000
Std. Dev.	0.658635
Skewness	-0.214667
Kurtosis	3.112208
Jarque-Bera	33.94387
Probability	0.000000
Sum	10974.16
Sum Sq. Dev.	1794.196
Observations	4137

Descriptive Statistics: Stats by Classification

- An important part of data description is the ability to compare basic statistics across subgroups.
- ***View → Descriptive Statistics & Tests → Stats by Classification*** table allows us to perform such an analysis more formally.

One can combine more series and conditions, e.g. s1 s2 s3<=100.





EViews: Introductory User Guide

STATISTICAL ANALYSIS: SIMPLE TESTS FOR SERIES

Hypothesis Tests on Series

- EViews allows you to carry out a number of hypothesis tests on a series.
- The main menu for all tests is the ***Descriptive Statistics & Tests*** menu.

General notes:

✓ ***Simple Hypothesis Tests***

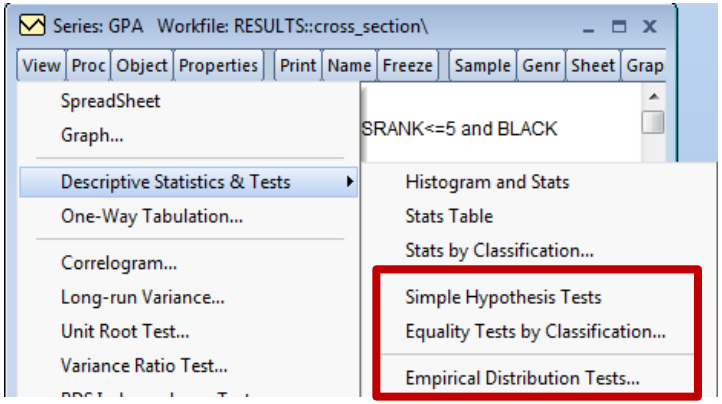
It tests for the mean, median and variance of the series.

✓ ***Equality Tests by Classification***

It tests equality of means medians and variances across subsamples (subgroups) of a series.

✓ ***Empirical distribution Tests***

It tests whether the data distribution of the series is drawn from a number of well-known distributions, i.e.: *Normal*, *Chi-Square*, *Exponential*, *Extreme (Max)*, *Extreme (Min)*, *Gamma*, *Logistic*, *Pareto*, *Uniform*, *Weibull*.



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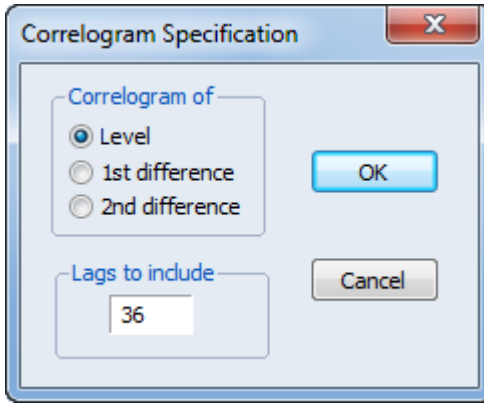
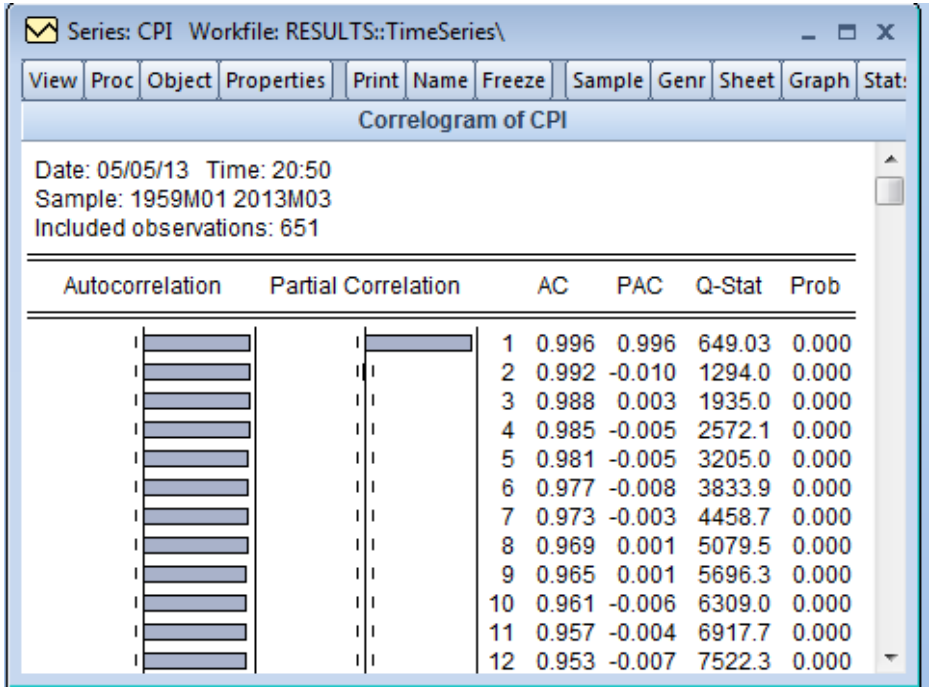
STATISTICAL ANALYSIS: CORRELOGRAM FOR SERIES

Time Series Analysis: Correlogram (Part I)

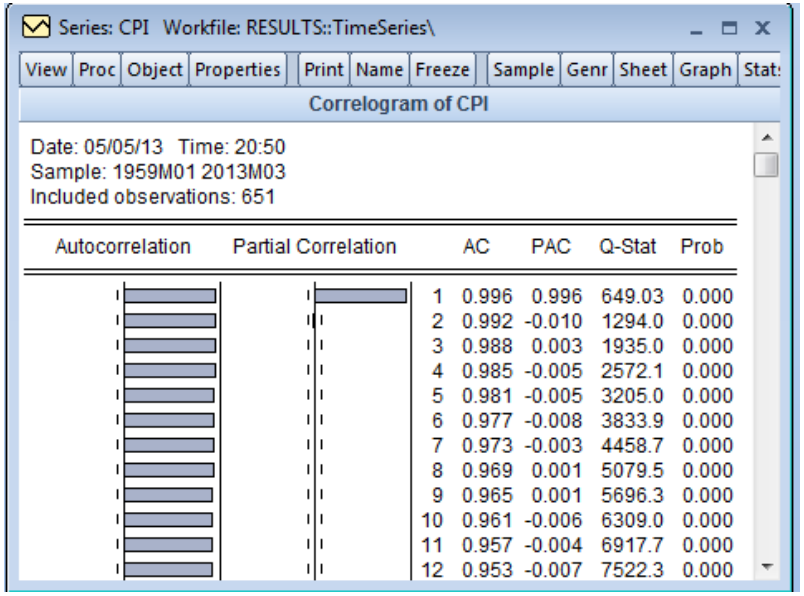
- Serial dependence (temporal dependence) is one of the most common features of time series data.
- The series ***View*** → ***Correlogram*** menu displays the autocorrelation and partial correlation functions of a series (up to a specified number of lags), which allows you to have a visual feel of the degree and pattern of the serial correlation in your data.





Time Series Analysis: Correlogram (Part II)

- The (level) *Correlogram* is shown here.
- There are three main parts:
  - ✓ The ***Autocorrelation (AC)*** is the correlation coefficient for values of the series *k-periods* apart. If the value of the first *AC* is non-zero, it means that the series is first-order serially correlated. If autocorrelation dies off geometrically as *k* increases, this is a sign of low-order AR process. If autocorrelation drops to 0 after a small number of lags, this is a sign of low-order MA process.
  - ✓ The ***partial correlation (PAC)*** at lag *k* is the coefficient of the regression of X_t on a constant and all lags of *X* up to *k*. If the partial correlation at lag *k* is close to 0, this means that autocorrelation is of the order less than *k*.
  - ✓ The last two columns report the ***Q-statistic*** and its *p*-value for the null that there is no autocorrelation up to order *k*.



	AC	PAC	Q-Stat	Prob
1	0.996	0.996	649.03	0.000
2	0.992	-0.010	1294.0	0.000
3	0.988	0.003	1935.0	0.000
4	0.985	-0.005	2572.1	0.000
5	0.981	-0.005	3205.0	0.000
6	0.977	-0.008	3833.9	0.000
7	0.973	-0.003	4458.7	0.000
8	0.969	0.001	5079.5	0.000
9	0.965	0.001	5696.3	0.000
10	0.961	-0.006	6309.0	0.000
11	0.957	-0.004	6917.7	0.000
12	0.953	-0.007	7522.3	0.000

Note that in this example, *AC* remain high even after 12 lags, while *PAC* drops to 0 in the 2nd lag. One issue with the data is that the series (CPI) has a unit root.

EViews: Introductory User Guide

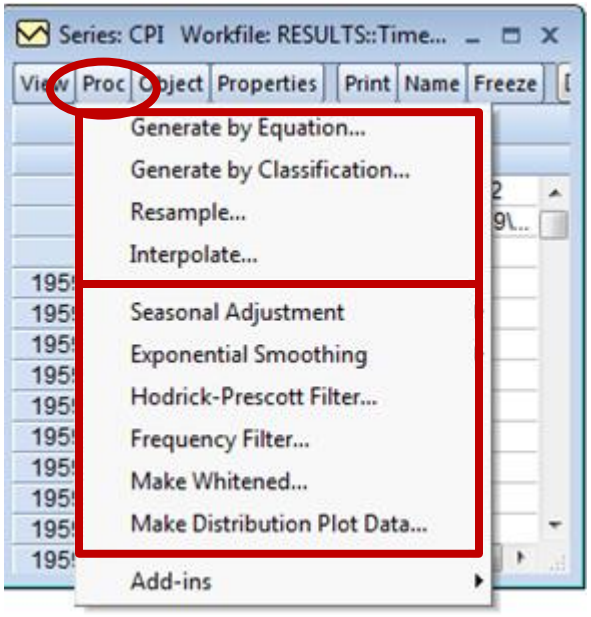
STATISTICAL ANALYSIS: GENERATING NEW SERIES

Proc Menu for Series

- The ***Proc*** menu can be used to generate series based on an existing series.
- You can view all available procedures for a series from this menu.

A ***Proc*** drop-down menu appears:

- ✓ You can generate a new series from an existing series by Equation, by Classification, by resampling, or by interpolating.
- ✓ You may also be able to perform a number of other procedures such as seasonal adjustment, exponential smoothing, filter the series using Hodrick-Prescot filter or band-pass filters, etc.

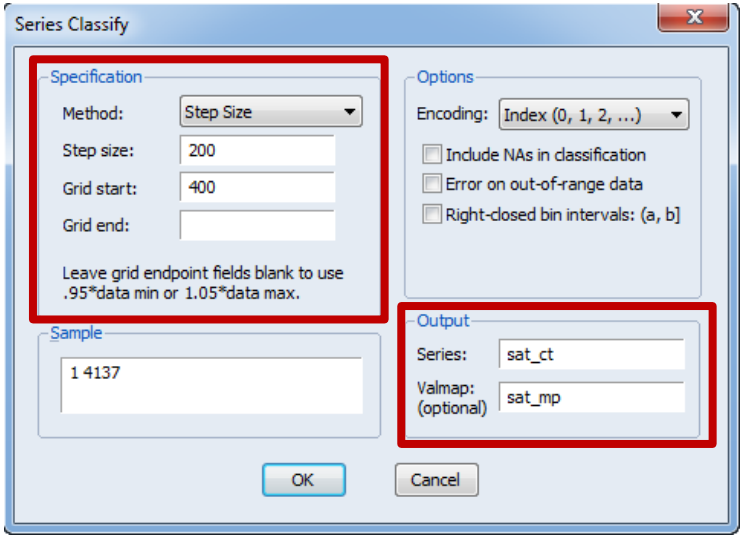


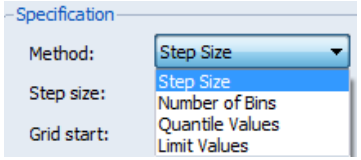
Generating a Series from Existing Series: Generate by Classification (Part I)

- ***Generate by Classification*** allows you to generate a categorical series using ranges, or bins of values in your series. The new series assigns individual observations into one of the classes defined in the classification.

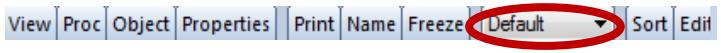
Generate by Classification:

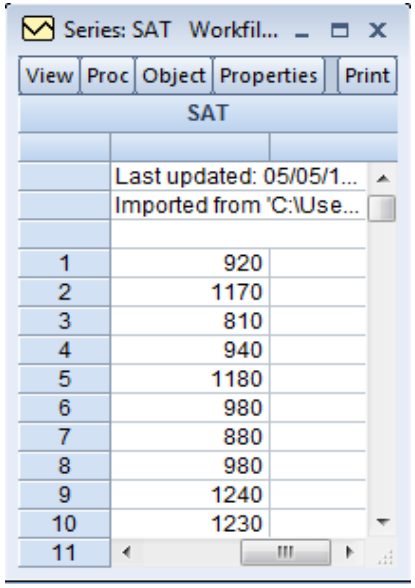
1. Open a series.
2. Click ***Proc*** → ***Generate by Classification***.
3. The ***Series Classify*** dialog box opens up. In the ***Specification*** section, the ***Method*** option has a drop down menu (shown below). This specifies the method used to create the categories. Let's select ***Step Size*** for now.
4. Under the ***Step Size*** field type **200**. This tells EViews to define a grid of bins of fixed size (200). So the series inputs are classified over equally-sized bins with a range of 200.
5. Under **Grid Start** type 400. This instructs EViews to start the grid at 400 and increase it by 200 until the end of the grid. We start at 400.
6. The ***Output*** section lists the name of the series with classification (in this case ***sat_ct***) and the name of the ***Valmap*** (in this case ***sat_mp)*** object which stores the information about the way the mapping is done.



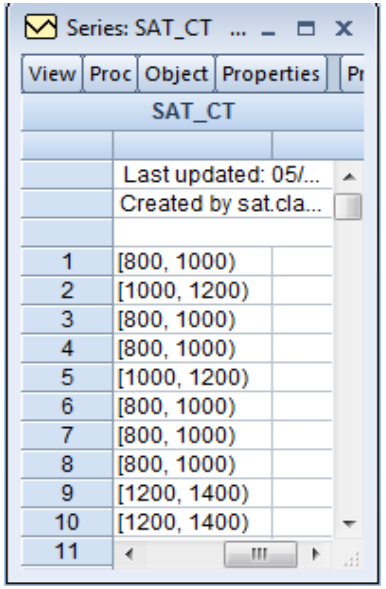


Generating a Series from Existing Series: Generate by Classification (Part II)

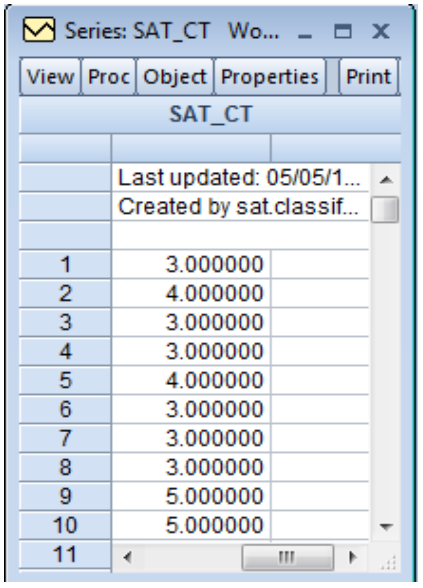
- As you can see, using our classification, EViews creates 7 bins as shown in *Valmap*. Note that ***SAT_ct*** series is shown as *Default* and *Raw Data* by pressing the drop-down menu from the toolbar 



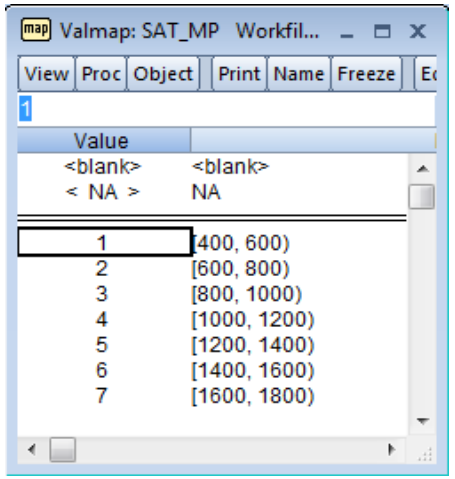
Original Series SAT



SAT_ct series
(default View)



SAT_ct series
(Raw Data View)



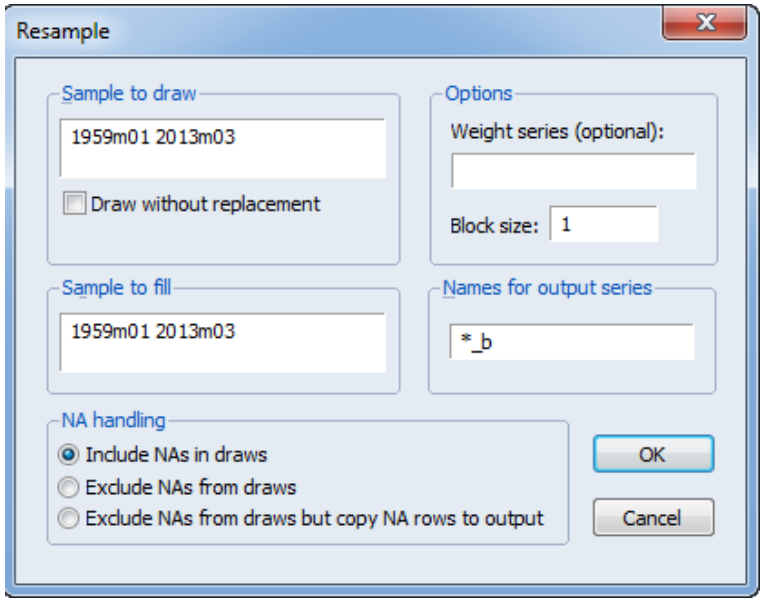
Valmap SAT_mp

Generating a Series from Existing Series: Resample

- We may need to create a new series based on an existing series by resampling the original series (bootstrapping standard errors, for example). You can use the ***Resample*** menu item to perform this task.

Resample:

1. Open a series.
2. Click ***Proc*** → ***Resample***.
3. The ***Resample*** dialog box opens up. You need to specify a number of things here:
   - *i.* ***Sample to draw*** – specify here the sample from which observations will be drawn.
   - *ii.* ***Draw without replacement*** – if you check this option, each raw will be drawn at most once.
   - *iii.* ***Sample to fill*** – this is the output sample.



Note: *If you select the* ***Draw without replacement*** *option, you need to make sure that the input sample (from which the observations are drawn) is as large as the output sample. If not, EViews issues an error warning.*

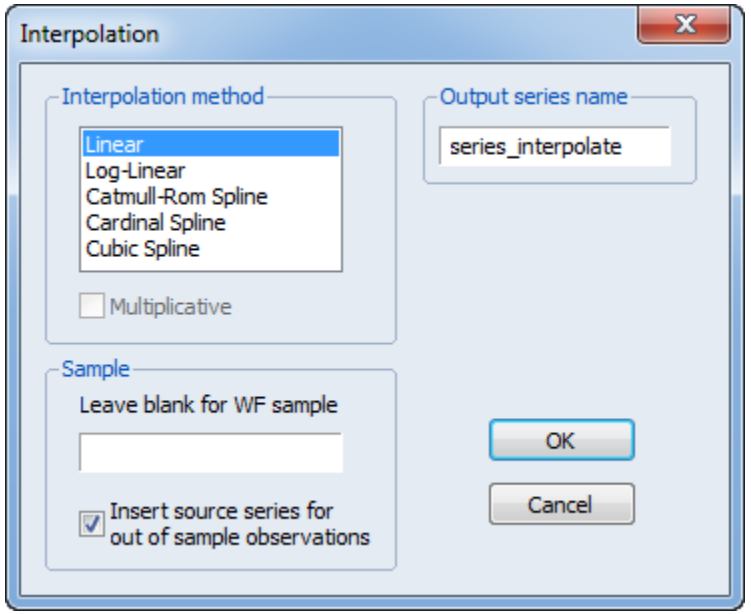
Note: By default, EViews draws from each row with equal probability. You can change this by specifying weights which give a higher probability to some rows versus others. Note that the weights do not have to add up to 1, since EViews will normalize them.

Generating a Series from Existing Series: Interpolate

- EViews offers a number of built-in procedures to fill in missing values in a series. The procedures that you can use to perform interpolation are: ***Linear***, ***log-linear***, the ***Catmull-Rom spline***, and the ***Cardinal Spline***.

Interpolate:

1. Open a series.
2. Click ***Proc*** → ***Interpolate***. The ***Interpolation*** dialog box opens up. Under the ***Interpolation method***, click one of the options.
3. The ***Sample*** box allows you to specify the sample over which the interpolation will be carried out. Leave blank to include the entire workfile sample.
4. Under ***Output series name*** section, type the name of the series: ***Series_interpolate.***



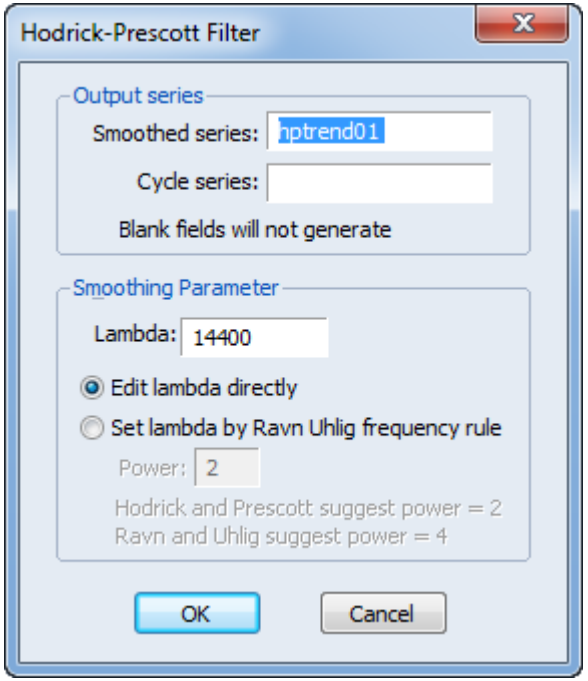
Generating a Series from Existing Series: Hodrick-Prescott Filter (Part I)

- The ***Hodrick-Prescott filter*** is widely used in macroeconomics to obtain a smooth estimate of the long-term trend of a series. The ***HP filter*** can be carried out very easily in EViews.

Hodrick-Prescott Filter:

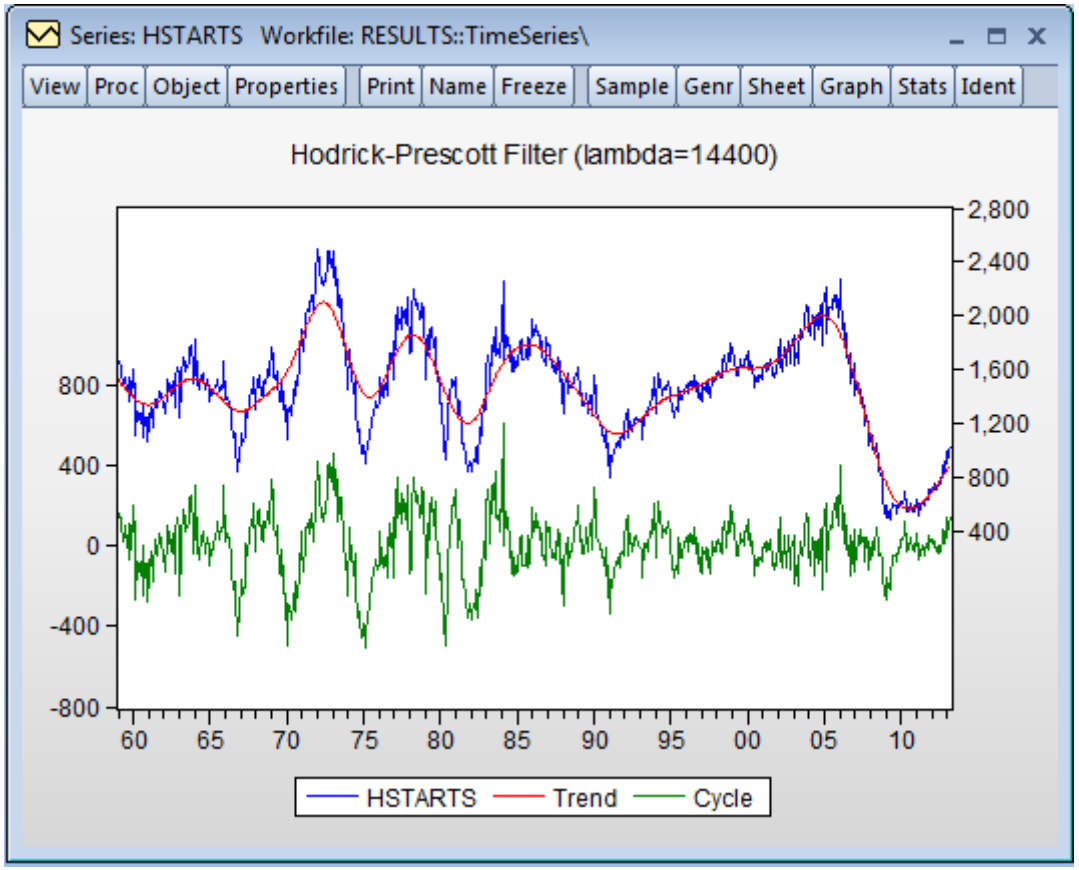
1. Open a series.
2. Click ***Proc*** → ***Hodrick-Prescott Filter***. The ***Hodrick-Prescott Filter*** dialog box opens up. Under the ***Output series*** section, type the series name (EViews suggests a name, but you can select your own).
3. Next, you need to specify the ***Smoothing Parameter***:
   - ✓ Llamda= 100 (if annual data)
   - ✓ Lamda = 1,600 (if quarterly data)
   - ✓ Lambda=14,400 (if monthly data; selected here)

   Alternatively you can use the Ravn and Uhlig frequency power rule (where power=4). The values of lambda above correspond to the default HP power rule of 2.



Generating a Series from Existing Series: Hodrick-Prescott Filter (Part II)

- Note that the view of the series has changed to show the original series, the **trend** (smoothed series, which is also saved in the workfile as ***hptrend01***) and the **Cycle** (the difference between ***hstarts*** and ***hptrend01***).



EViews: Introductory User Guide

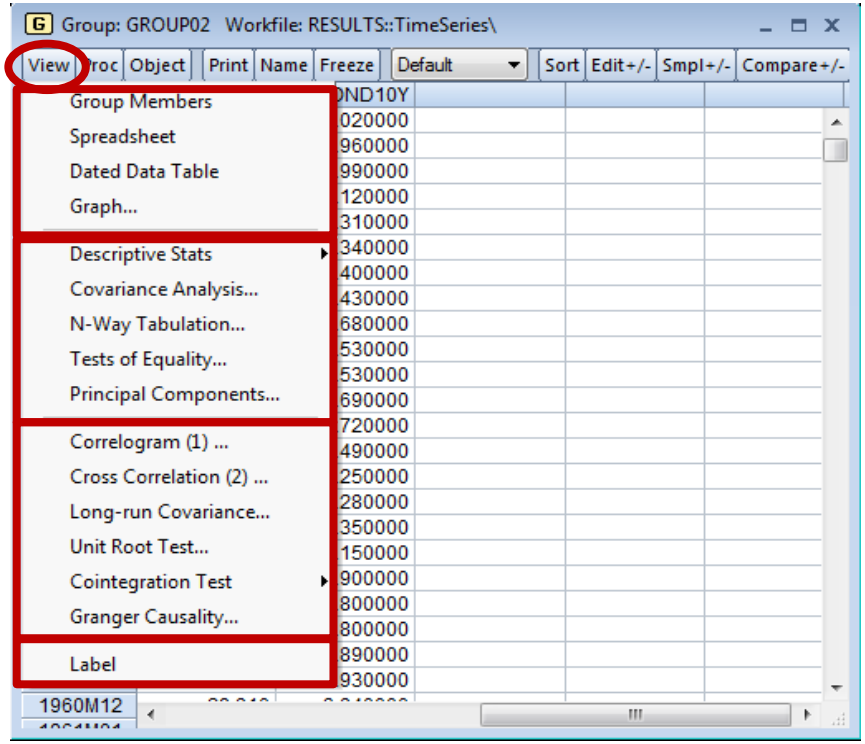
STATISTICAL ANALYSIS: GROUPS

View Menu for Groups

- You can use the ***View*** menu item to perform a number of analysis, display views, etc. for a collection of series in a group.

A ***View*** drop-down menu appears with a number of options grouped in 4 sections:

- ✓ The first block provides various ways of looking at the data in the group.
- ✓ The second block provides general statistics.
- ✓ The third block provides general statistics for time series.
- ✓ The fourth block allows you to modify/display the group labels.



Descriptive Statistics: Common Sample

- Basic statistical summaries of the series contained in one group can be found under the ***View*** → ***Descriptive Statistics*** → **Common Sample**.
- General stats for all the series in the sample are calculated. Note that statistics are computed using a common sample. This means that if a series has missing observations, stats for all series are computed over the common sample for which all series have non-missing observations.

Descriptive Statistics: Individual Sample

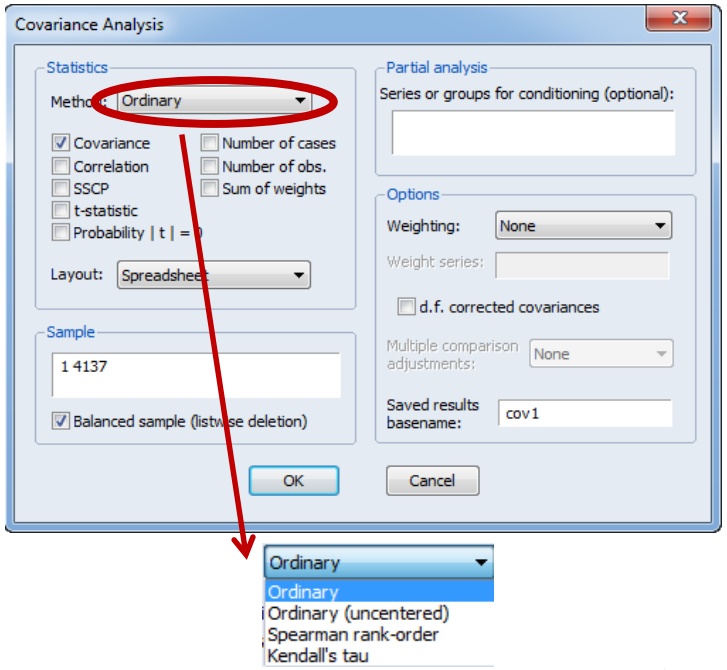
- You can also compute Descriptive Statistics for the series in one group over the sample of each individual series using ***View*** → ***Descriptive Statistics*** → ***Individual Sample***.
- Notice that this table differs slightly from the previous one. This is because the stats are computed for the entire available sample (individually per series in the group).

Covariance Analysis (Part I)

- The ***Covariance Analysis*** view is a very useful tool to obtain different measures of association (covariances/correlations) for the series in a group.
- There are four general classes in EViews from which you can compute measures of association: ***ordinary (Pearson)***, ***ordinary uncentered***, ***Spearman rank-order***, and ***Kendall's tau-a and tau-b***.

Covariance Analysis (Part I):

1. Open a group.
2. Click ***View*** → ***Covariance Analysis.*** The ***Covariance Analysis*** dialog box opens up. Under ***Method***, click the drop-down menu choose the type of measure. Click the ***Covariance*** box (the default). Under ***Saved results basename***, name your results so they are saved in the workfile.
3. The covariance is displayed in a spreadsheet format (the default). Note also that the covariance is now saved in the workfile with name ***cov1cov***. The extension *cov* is added to indicate that this is a measure of covariance. The saved covariance matrix does not show the name of the original series but only the matrix elements.

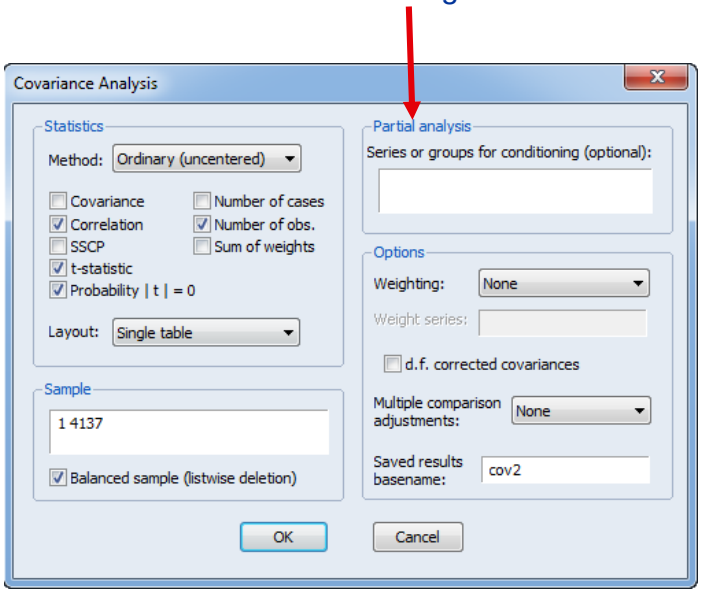


Covariance Analysis (Part II)

Covariance Analysis (Part II):

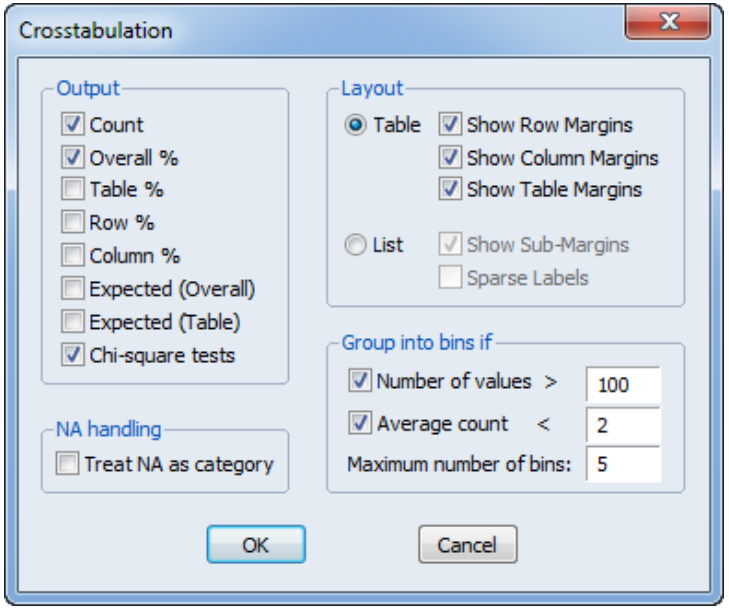
1. Open a group.
2. Click ***View*** → ***Covariance Analysis*****.** The ***Covariance Analysis*** dialog box opens up. Under ***Method***, select ***Ordinary uncensored***.
3. Check the **Correlation, t-statistic**, **Probability** and **Number of obs** boxes.
4. Select **Single table** under ***Layout***.
5. Under ***Saved results basename***, name your results so they are saved in the workfile.
6. The table shows all statistics in the order in which they appear at the top of the table. Note also that results are now saved in a number of matrices: ***cov2corr*** (containing correlations), ***cov2prob*** (containing *p-values*), ***cov2tstat*** (containing t-stats), ***cov2obs*** (containing the number of observations).

One can condition this over a conditioning variable. EViews automatically balances the sample, computes statistics and displays the partial covariances/correlations, controlling for all variables in the conditioning set.



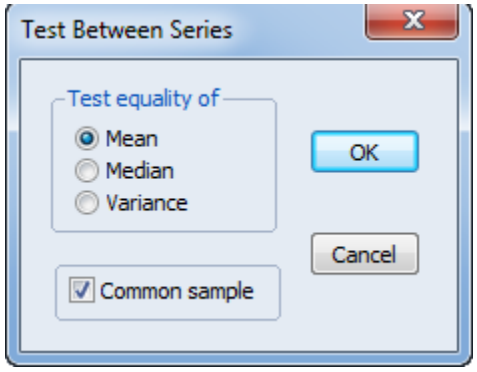
N-Way Tabulation

- A useful tool when analyzing data is the ***N-Way tabulation*** in the group ***View***.
- This allows us to classify the observations into subgroups, check for independence among the series in the group, etc.



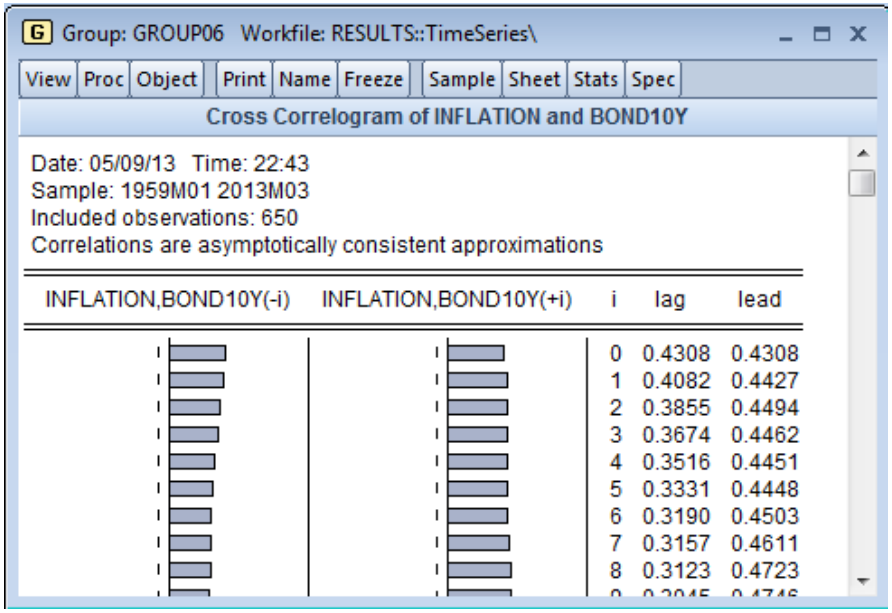
Tests of Equality

- The ***Tests of Equality*** item of the ***View*** menu tests the null hypothesis that all series in a group have the same mean (or median or variance).



Cross Correlogram

- The ***Cross Correlation*** entry on the group's ***View*** menu shows the table of cross-correlations between the series in the group.



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