

# Example 3.4

## Graphics for data analysis in Gretl

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Dpt. Applied Economics III (Econometrics and Statistics)

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  - Chicken consumption.
  - Visitors to Bilbao.
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- 4 3.4.4. Editing graphs.

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## Example 3.4.1. Time series graphs. Chicken consumption.

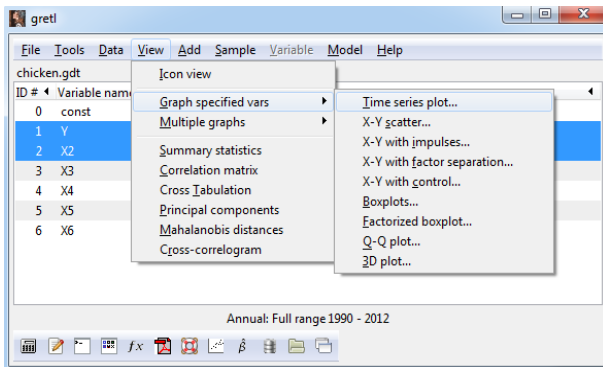
### Questions.

Open the data file `chicken.gdt` to make some time series plots of the variables `Y`, `X2`, `X3`, `X4` and `X5`.

- Represent all the variables on a single graph. Save this graph as an icon in the Gretl session.
- Represent all the variables in separate small graphs. Save the output as an icon in the Gretl session.
- Save the session with the name `Seschicken`.
- Interpret the results.

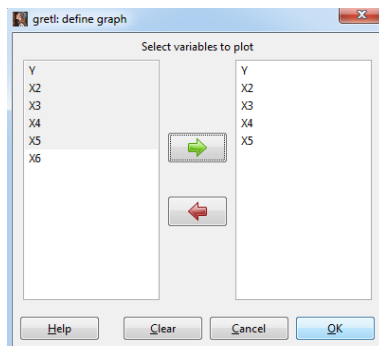
## Example 3.4.1. Time series graphs. Chicken consumption.

To plot several time series [on a single graph](#), go up to the Menu Bar and click  
**View -> Graph specified vars -> Time series plot...**



## Example 3.4.1. Time series graphs. Chicken consumption.

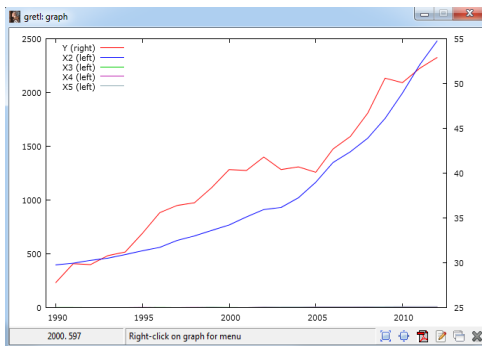
Select the variables  $Y$ ,  $X_2$ ,  $X_3$ ,  $X_4$  and  $X_5$  in the dialog box.



## Example 3.4.1. Time series graphs. Chicken consumption.

The five selected variables are plotted on a single graph. The X-axis (abscissas) represents time. There are two Y-axes (ordinates), left (Y) and right (Y2), to be able to represent the selected series using two scales.

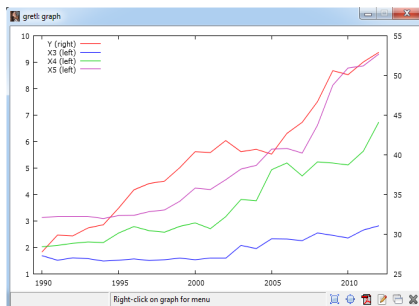
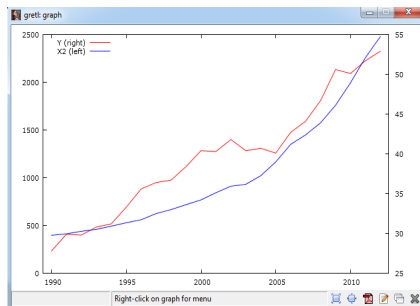
The right ordinate axis represents  $Y$  (consumption) and the left ordinate axis represents  $X_2, X_3, X_4$  and  $X_5$ . It is not possible to see the variables  $X_3, X_4$  and  $X_5$  in the graph (even if they are there) because their range of values is much smaller than the range of the variable  $X_2$ .



## Example 3.4.1. Time series graphs. Chicken consumption.

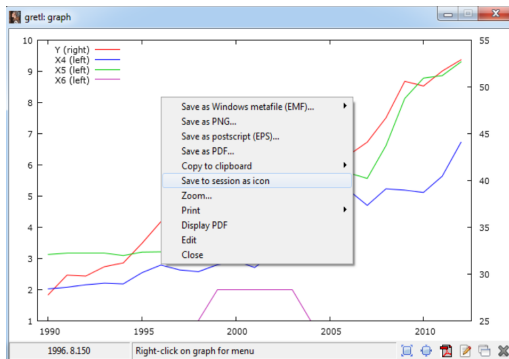
It should be noted that it is very important to take into account the range of values when plotting data.

In this example it would more informative to plot  $Y$  (consumption) and  $X_2$  (income) on one graph, and  $Y$  (consumption) and the three price series,  $X_3$ ,  $X_4$  and  $X_5$ , on another one.



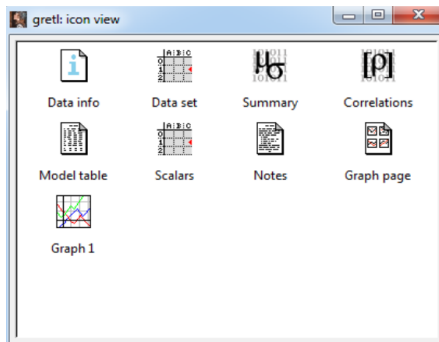
## Example 3.4.1. Time series graphs. Chicken consumption.

To [save the graph](#) as an icon to the session, right-click on the graph and select the option *Save to session as icon* from the pulldown menu.



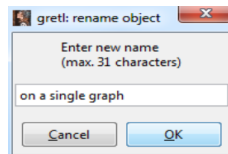
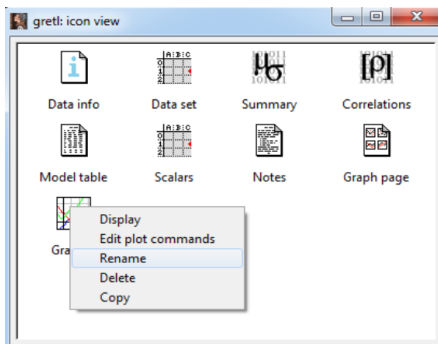
## Example 3.4.1. Time series graphs. Chicken consumption.

The session can be accessed from the Toolbar by clicking on the icon *session icon view*. You may see the graph saved as the icon *Graph 1*.



## Example 3.4.1. Time series graphs. Chicken consumption.

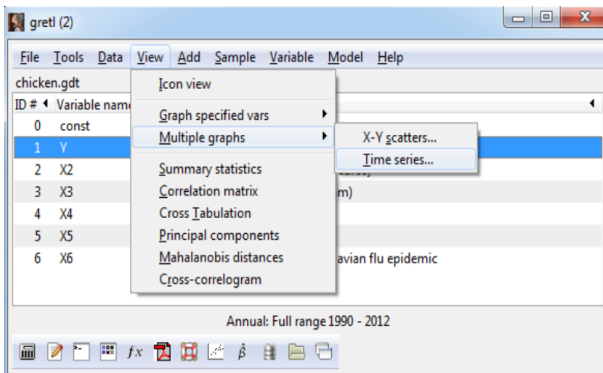
To change the name of this icon, right-click on the icon *Graph 1* and select the option *Rename* from the pulldown menu. Give a name to the icon in the dialog box, for instance, *on a single graph*.



## Example 3.4.1. Time series graphs. Chicken consumption.

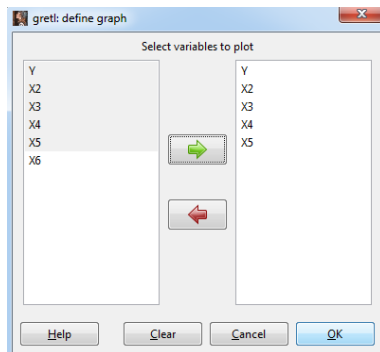
To represent several time series **in separate small graphs**, go up to the Menu Bar and click

**View -> Multiple graphs -> Time series ...**



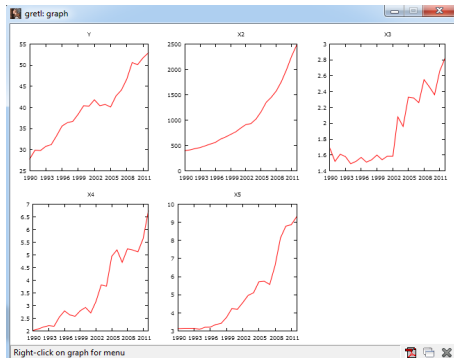
## Example 3.4.1. Time series graphs. Chicken consumption.

Select the variables  $Y$ ,  $X2$ ,  $X3$ ,  $X4$  and  $X5$  in the dialog box.



## Example 3.4.1. Time series graphs. Chicken consumption.

The window **gretl:graph** shows five separate graphs, one for each variable.

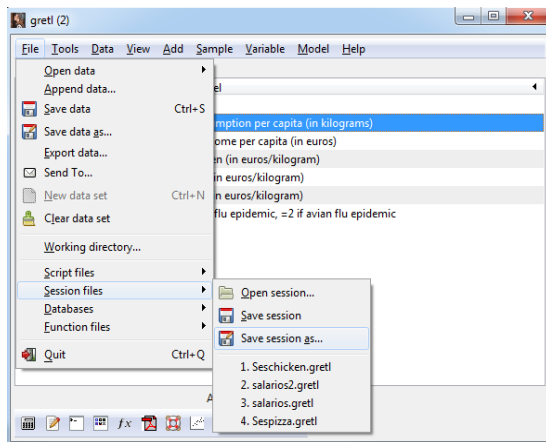


In order to save this graph as an icon in the session follow the procedure explained above. Give the name *separate graphs* to this icon.

## Example 3.4.1. Time series graphs. Chicken consumption.

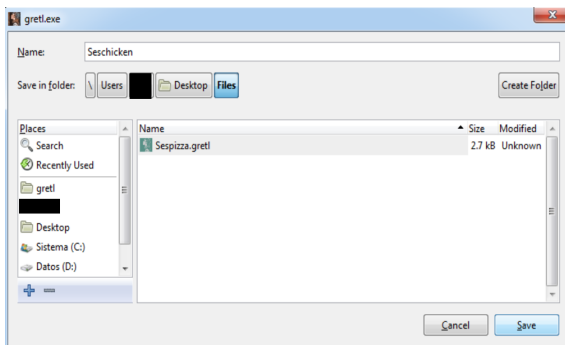
To **save** the session, go up to the Menu Bar and click

**File -> Session files -> Save session as...**



## Example 3.4.1. Time series graphs. Chicken consumption.

Look for the folder where you want to save the session (in this case, the Desktop) and write the name of the session, Seschicken.



## Example 3.4.1. Time series graphs. Chicken consumption.

### Results.

- All the variables increase steadily over time. The long-term behaviour of the series is called trend. Therefore, we could say that these variables show all an upward trend.
- Chicken consumption increases over the whole sample but for the years 2002 to 2005.
- Income per capita increases continuously throughout the sample. Its rate of growth seems to be higher from 2002 onwards.
- The price of chicken oscillates around the value 1.6 until the year 2002. From this year onwards, the price increases quite rapidly.
- The prices of pork and beef increase over the whole sample.

## Example 3.4.1. Time series graphs. Visitors to Bilbao.

### Questions.

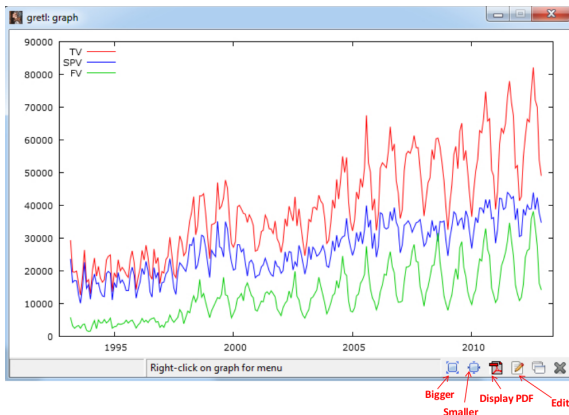
Open the file `tourism.gdt` and graph the variables  $TV$ ,  $SPV$ , and  $FV$ .

- Represent the three variables on a single graph. Save the graph as an icon to the session.
- Represent the three variables in three separate graphs. Save the output as an icon to the session.
- Save the session with the name `Sestourism`.
- Interpret the results.

## Example 3.4.1. Time series graphs. Visitors to Bilbao.

View -> Graph specified vars -> Time series plot ...

and select the variables *TV*, *SPV* and *FV*.



## Example 3.4.1. Time series graphs. Visitors to Bilbao.

There is a menu at the bottom of the **graph** window that enables us to:

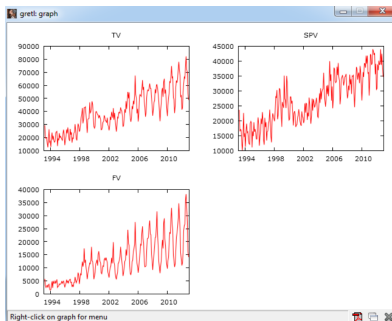
- Enlarge the graph: **Bigger**.
- Reduce the size of the graph: **Smaller**.
- View the graph in pdf format: **Display PDF**.
- Change the characteristics of the graph: **Edit**.

Follow the procedure explained before to save this graph as as icon to the session.

## Example 3.4.1. Time series graphs. Visitors to Bilbao.

View -> Multiple graphs -> Time series ...

and select variables *TV*, *SPV* and *FV*.



Follow the procedure explained before to save this graph as an icon to the session.

Finally, save the session in your own folder with the name *Sestourism*.

## Example 3.4.1. Time series graphs. Visitors to Bilbao.

### Results (I).

The data in the file are tourist data, in particular, the number of visitors to Bilbao. Furthermore, they are **monthly** data.

A visual inspection of the time series plot in slide 19 shows that the three variables present a **cyclical pattern**, which is more regular in the case of total visitors (red line) than in the case of foreign visitors (green line).

Looking at the data carefully, it may be concluded that the period of the cycle is always one year with the peaks in the summer months (July and August) and the troughs in the winter months (December, January, February).

This one-year periodic, repetitive, and generally regular pattern is called *seasonality*. Therefore, it may be concluded that the series of visitors to Bilbao show monthly seasonal behaviour.

## Example 3.4.1. Time series graphs. Visitors to Bilbao.

### Results (II).

- It may be observed that the series of foreign visitors oscillates around a constant level until 1998 without a clear seasonal pattern. From 1999 onwards, the level of visitors increases and the seasonal pattern is quite clear (there is a concentration of foreign visitors in summers).
- The evolution of the series of visitors coming from Spain is quite different. A seasonal cycle may be observed from the beginning of the sample although it changes over time. Spanish visitors are not concentrated in summers like foreigners: there are other peaks in the annual cycle related to Eastern, beginning of autumn, ... This is due to the fact that for the Spaniards Bilbao is not only a summer destination but a week-end destination as well. Therefore we find peaks of visitors in summers and in periods related to short holidays.
- Analysing the temporal evolution of the visitors, it may be concluded that the number of visitors increases over time, that is, they present an upward trend.

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## Example 3.4.2. Scatterplots.

### Questions.

a. Open the file `pizza.gdt` and graph:

- Consumption against income.
- Consumption against age.
- Income against age.
- Consumption against income and age.

Save all the graphs as icons to the session.

b. Save the session.

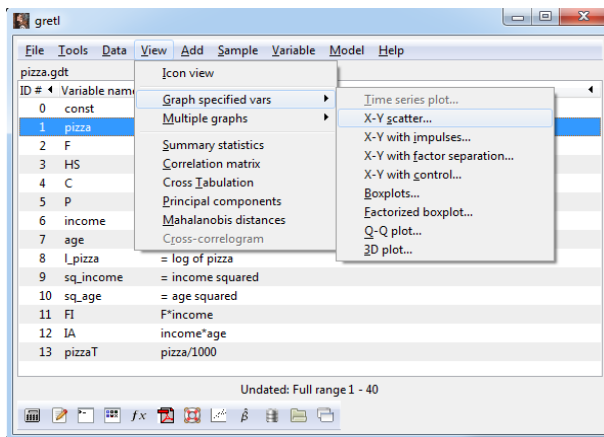
c. Interpret the results.

d. Compare the results obtained in this graphical analysis with the conclusions you drew from the descriptive analysis carried out in [Example 3.3](#).

## Example 3.4.2. Scatterplots.

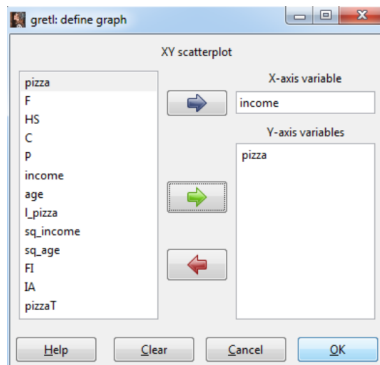
To obtain scatterplots, go up to the Menu Bar and click

View -> Graphs specified vars -> X-Y scatter...



## Example 3.4.2. Scatterplots.

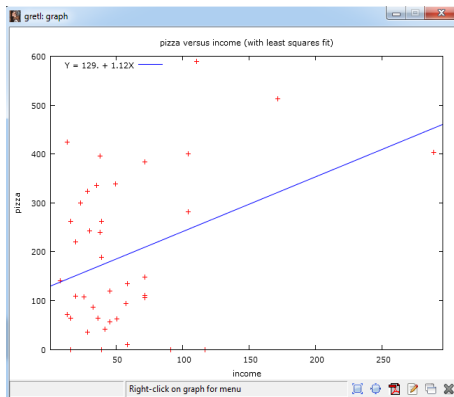
Choose in the dialog box the variable that goes in X-axis (income) and the variable that goes in the Y-axis (pizza).



## Example 3.4.2. Scatterplots.

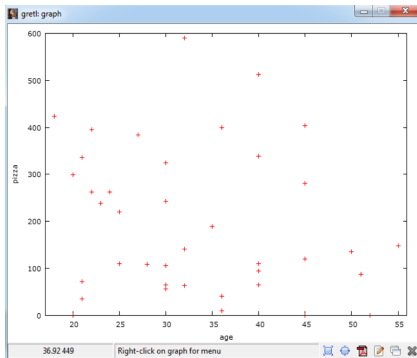
The output is a graph containing the cloud of points  $(X, Y)$  and the OLS fitted line (see Lesson 5).

*Pizza consumption versus Income*

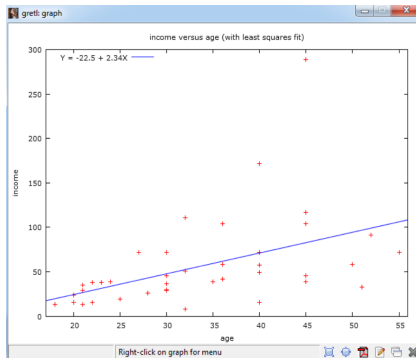


## Example 3.4.2. Scatterplots.

*Pizza consumption versus Age*



*Income versus Age*

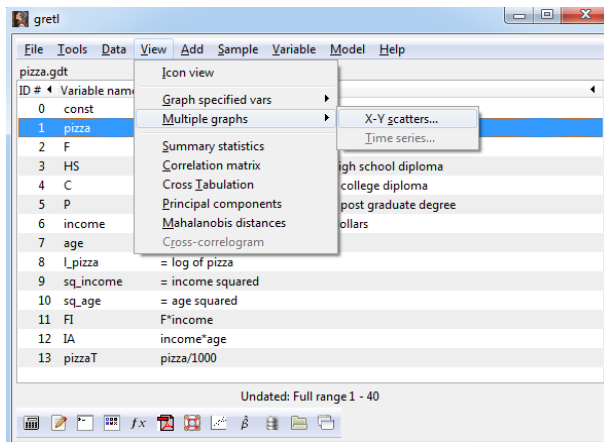


Follow the procedure explained above to save each graph as an icon to the Gretl session.

## Example 3.4.2. Scatterplots.

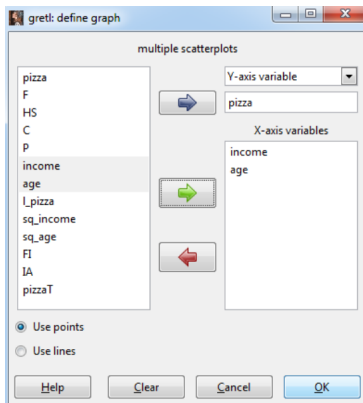
To obtain several scatterplots on a single graph, go up to the Menu Bar and click

**View -> Multiple graphs -> X-Y scatters...**



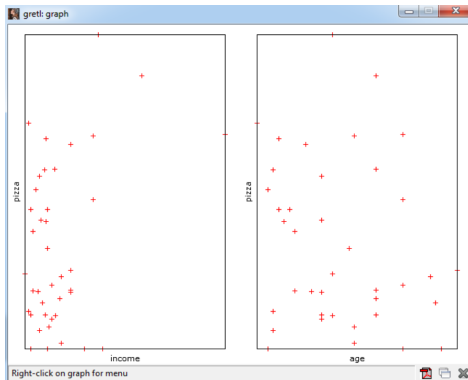
## Example 3.4.2. Scatterplots.

Choose in the dialog box the variable that goes in Y-axis (which is the same for all the scatterplots) and the variables that go in the X-axis.



## Example 3.4.2. Scatterplots.

The output window shows two scatterplots, the first one graphs consumption against income and the second one consumption against age.



Follow the procedure explained above to save this graph as an icon to the Gretl session. Finally, save all the changes to the session file called *Sespizza*.

## Example 3.4.2. Scatterplots.

### Results (comparing to Example 3.3.)

- The scatterplot of consumption against income shows a positive relationship between these two variables, that is, richer clients consume more pizza. This result coincides with the positive correlation coefficient between consumption and income obtained in [Example 3.3](#).
- The scatterplot of consumption against age does not show a clear relationship between these two variables. Although consumption of pizza is low for clients older than 45, you may observe high levels of consumption for a wide range of ages. This result coincides with the value of the correlation coefficient between consumption and age obtained in [Example 3.3](#), -0.21, negative and small.
- The scatterplot shows a positive relationship between age and income. Remember that in [Example 3.3](#) we obtained a positive correlation coefficient between age and income (0.4685).

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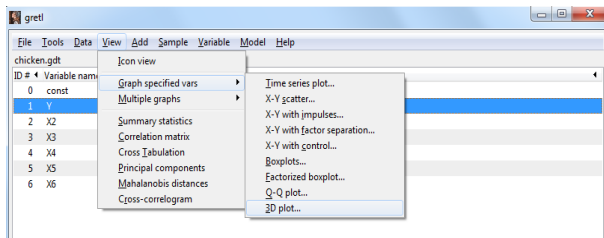
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## Example 3.4.3. 3D scatterplot graphs.

### Questions.

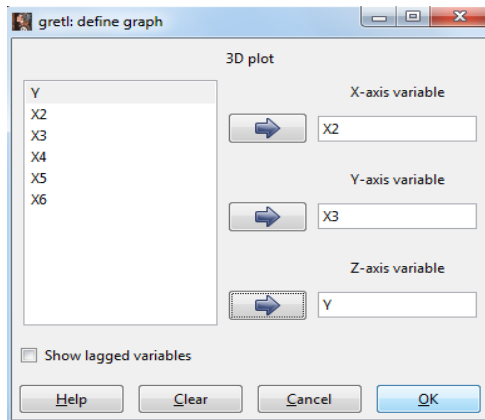
Open the data file `chicken.gdt` and plot chicken consumption against income and price of chicken.

View -> Graph specified vars -> 3D plot ...



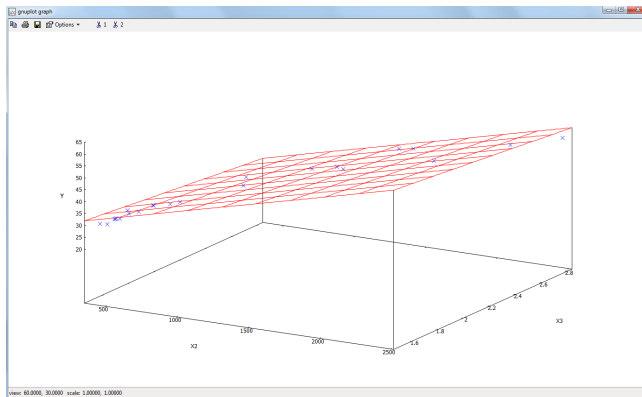
## Example 3.4.3. 3D scatterplot graphs.

Select the variable that goes in each axis.



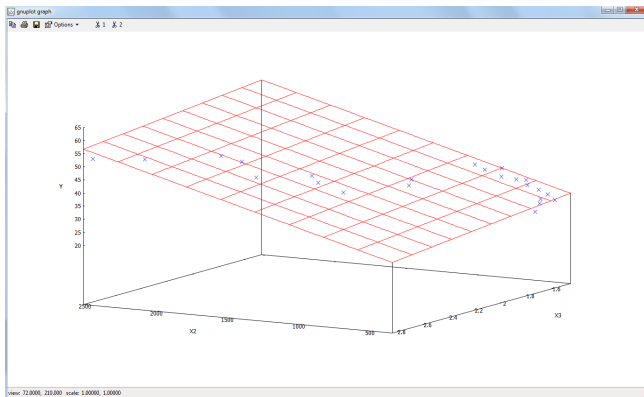
## Example 3.4.3. 3D scatterplot graphs.

The result is a 3D graph where the surface shows the relationship among  $Y$ ,  $X_2$  and  $X_3$ .



## Example 3.4.3. 3D scatterplot graphs.

To rotate the graph, click on any vertex using the right mouse button.



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## Example 3.4.4. Editing graphs.

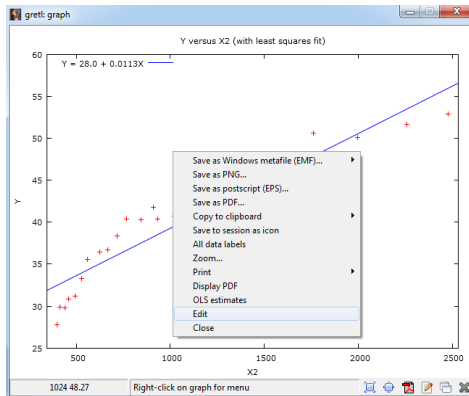
### Questions.

Open the data file `chicken.gdt`, plot chicken consumption ( $Y$ ) against income ( $X2$ ) and edit the graph as follows:

- Delete the OLS fitted line.
- Write the title "Pizza consumption versus income".
- Change the default font to Calibri 10 bold.
- Name the Y-axis "Pizza consumption" and the X-axis, "Income".
- Set new limits for the X-axis, minimum 340 and maximum 2550.
- Change the point  $+$  to a blue square.
- Add the label  $I > 1500$ .
- Add a dotted vertical line in  $I=1500$ .

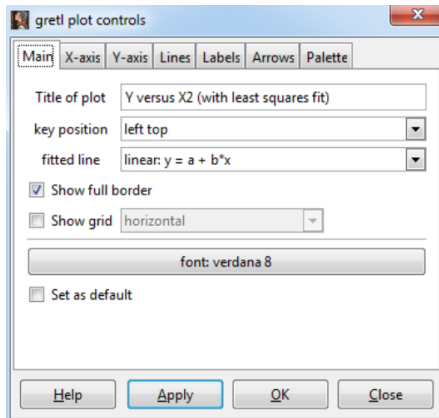
## Example 3.4.4. Editing graphs.

To [change the characteristics of a graph](#), right-click on the graph and select the option *Edit* from the pulldown menu.



## Example 3.4.4. Editing graphs.

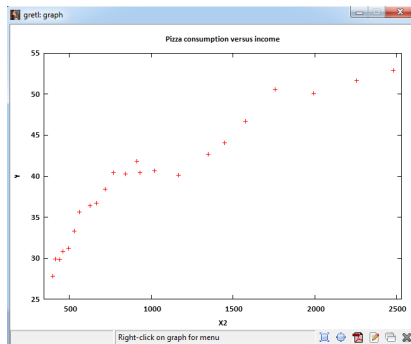
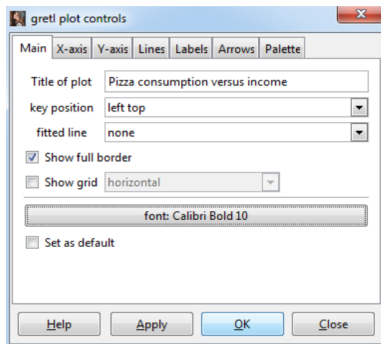
The dialog box allows to change several aspects of the graph: title, axis, lines, add labels, arrows, ...



## Example 3.4.4. Editing graphs.

In the **Main** tab, it is possible to

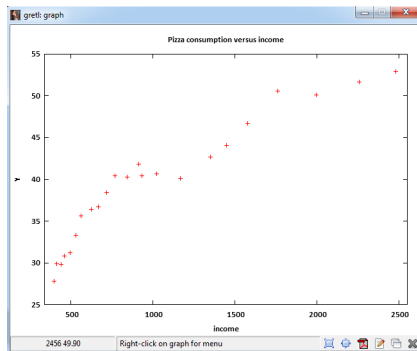
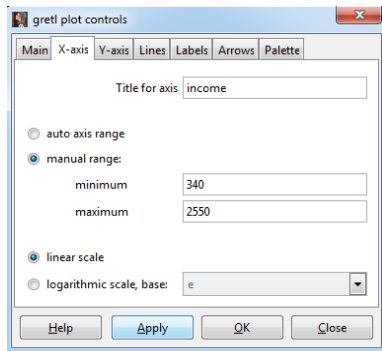
- Delete the OLS fit, selecting *fitted line: none*.
- Write *Title of plot: Pizza consumption versus income*.
- Change the font left-clicking on **font: verdana 8** and selecting in the new dialog box the font Calibri 10 bold.



## Example 3.4.4. Editing graphs.

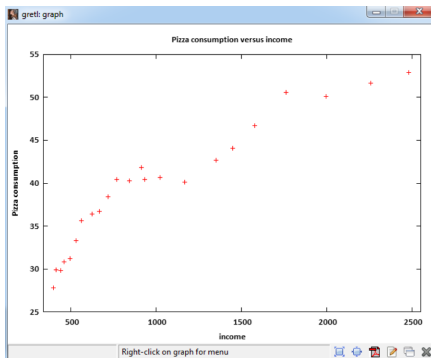
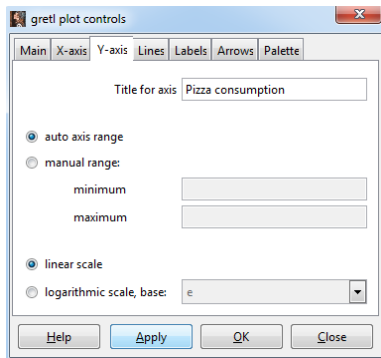
In the **X-axis** tab, it is possible to

- Change the name of the axis, writing *Title for axis: Income*.
- Change the range of values, clicking on *manual range* and writing the new minimum and maximum values.



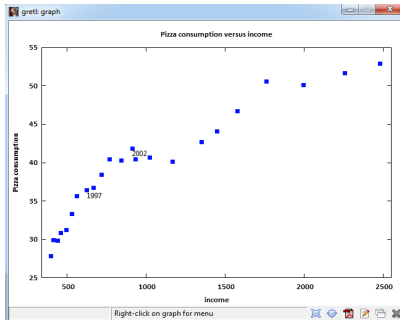
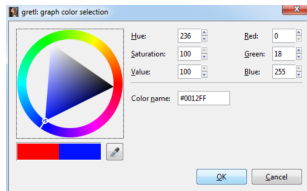
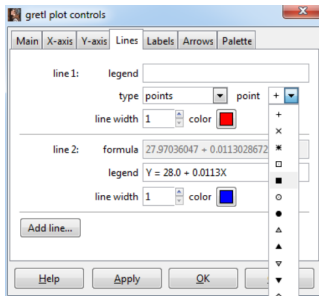
## Example 3.4.4. Editing graphs.

In the **Y-axis** tab, it is possible to change the name of the axis writing *Title for axis: Pizza consumption*.



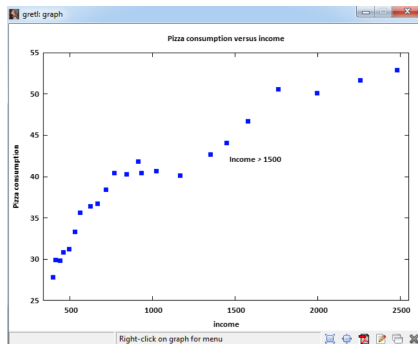
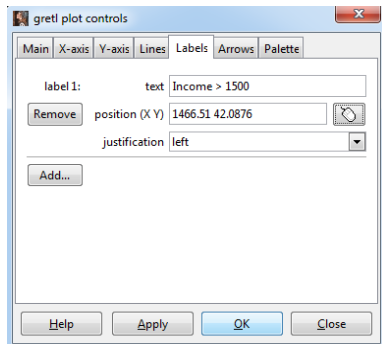
## Example 3.4.4. Editing graphs.

In the **Lines** tab, it is possible to change the type of point, selecting in the *points* pulldown menu a square. To change the colour of the point left-click on *color*. Choose a colour in the dialog box.



## Example 3.4.4. Editing graphs.

To highlight the area of the plot where income is higher than €1500, open the tab **Labels** and click **Add**. In the new dialog box write *text: Income > 1500* and indicate the position of this label by clicking first on the icon *mouse* and then on the point of the plot where you want the label to be.



## Example 3.4.4. Editing graphs.

To add lines or arrows open the **Arrows** tab and click **Add**. In the new dialog box, select the option line is dotted. To indicate the position of the line, click on the icon *mouse* and then on the point of the plot where the line starts and on the point where the line finishes.

