Outline

Simple linear regression with Gretl or R

R is a package for econometric, statistical and data analysis, written in the C programming language. It is a free software.

- Very powerfull software environement for statistical computing and graphics.
- A wide variety of estimators : least squares, maximum likelihood, GMM, single-equation and system methods.
- Time series methods : ARMA, GARCH, VARs and VECMs, unit-root and cointegration tests, etc.
- Data science methods
- This software can be downloaded at **https ://cran.r-project.org/mirrors.html** and run under Windows, Mac/OS or Linux.
- User's guides are accessible at **https ://cran.r-project.org/manuals.html**. First free book to read **https ://cran.r-project.org/doc/manuals/R-intro.pdf**.

Gretl is a package for econometric analysis, written in the C programming language. It is a free, open-source software.

- Easy intuitive interface but can also use scripts.
- A wide variety of estimators : least squares, maximum likelihood, GMM, single-equation and system methods.
- Time series methods : ARMA, GARCH, VARs and VECMs, unit-root and cointegration tests, etc.
- This software can be downloaded at **http ://gretl.sourceforge.net/** and run under Windows, Mac/OS or Linux.
- A user's guide is accessible at **http ://www.learneconometrics.com/gretl.html**

Gretl or R ?

What should you choose ?

- R is amongst the most popular languages for econometric, and statistical analysis. Not Gretl. [1]
- But Gretl has an easy intuitive interface (still proposing a quite sophisticated econometric package). You do not need to practice much to use Gretl contrary to R.
- R is definitely a more comprehensive package that will require some invesment and some independence toward its uses.
- Gretl or R are more than enaugh for this course and produce nice statistical Tables and Graphs that can easily be used in Word or LaTeX.

Be sure that you are able to use one of them before coming to the labclass. The Labclass will be conducted in Gretl but some R corrections will also be proposed.

1. Python is more popular for Data Science.

Importing data

Figure : Data importation under gretl

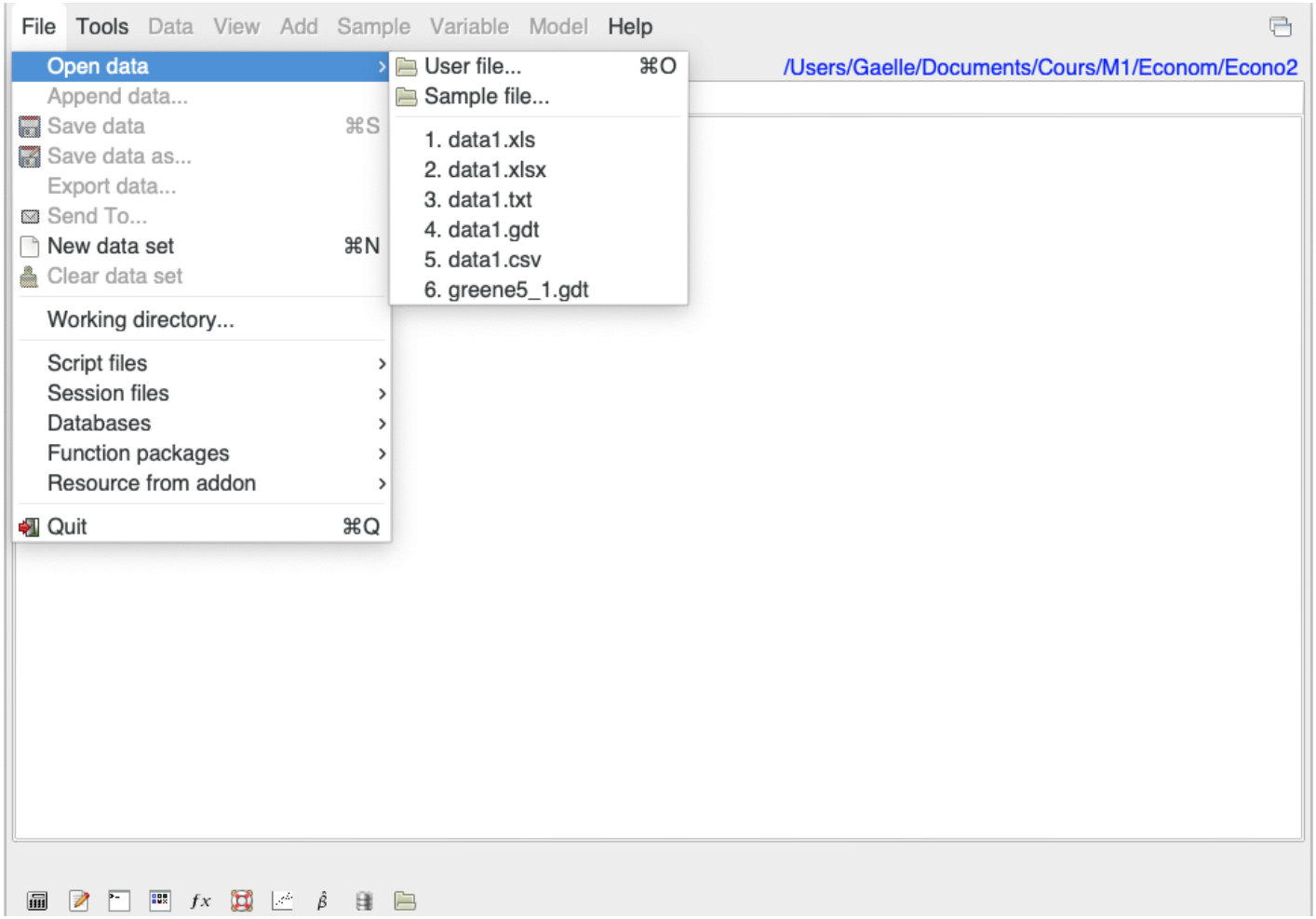


Figure : Opening data

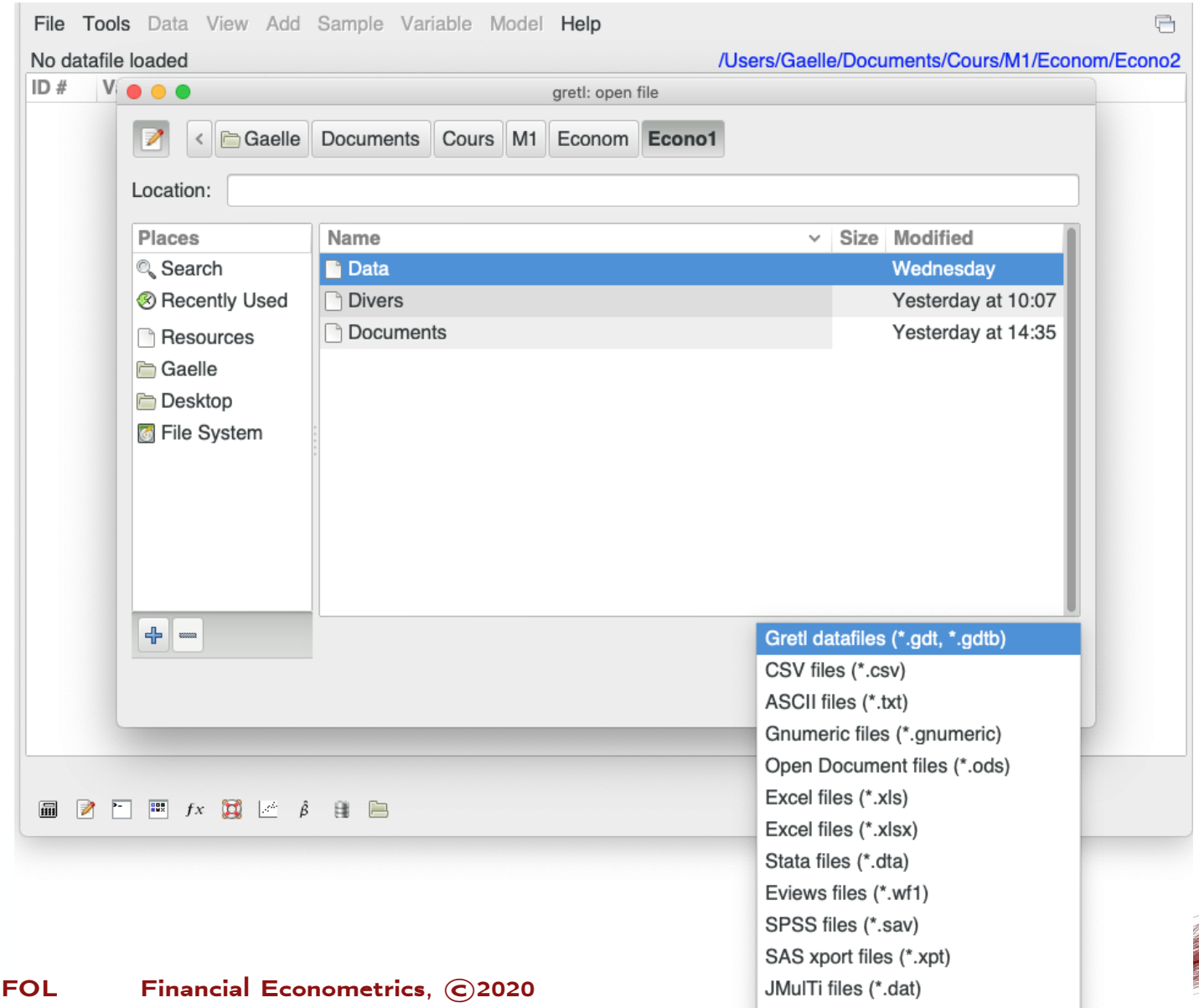


Figure : Using a script

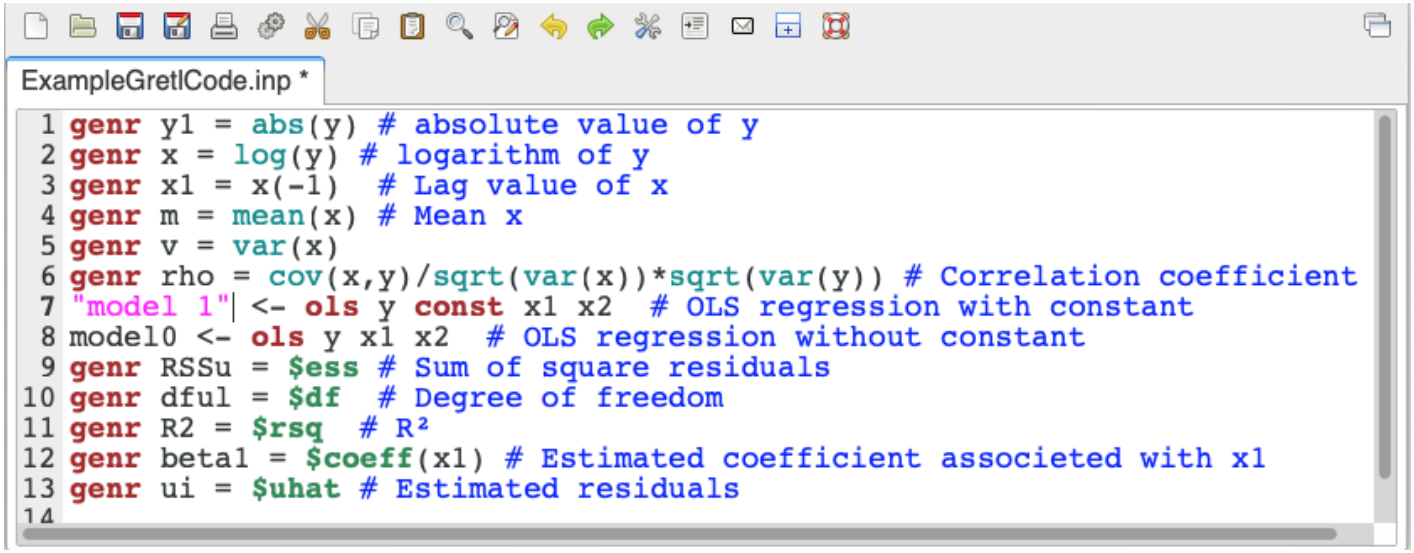


Figure : equivalent script example

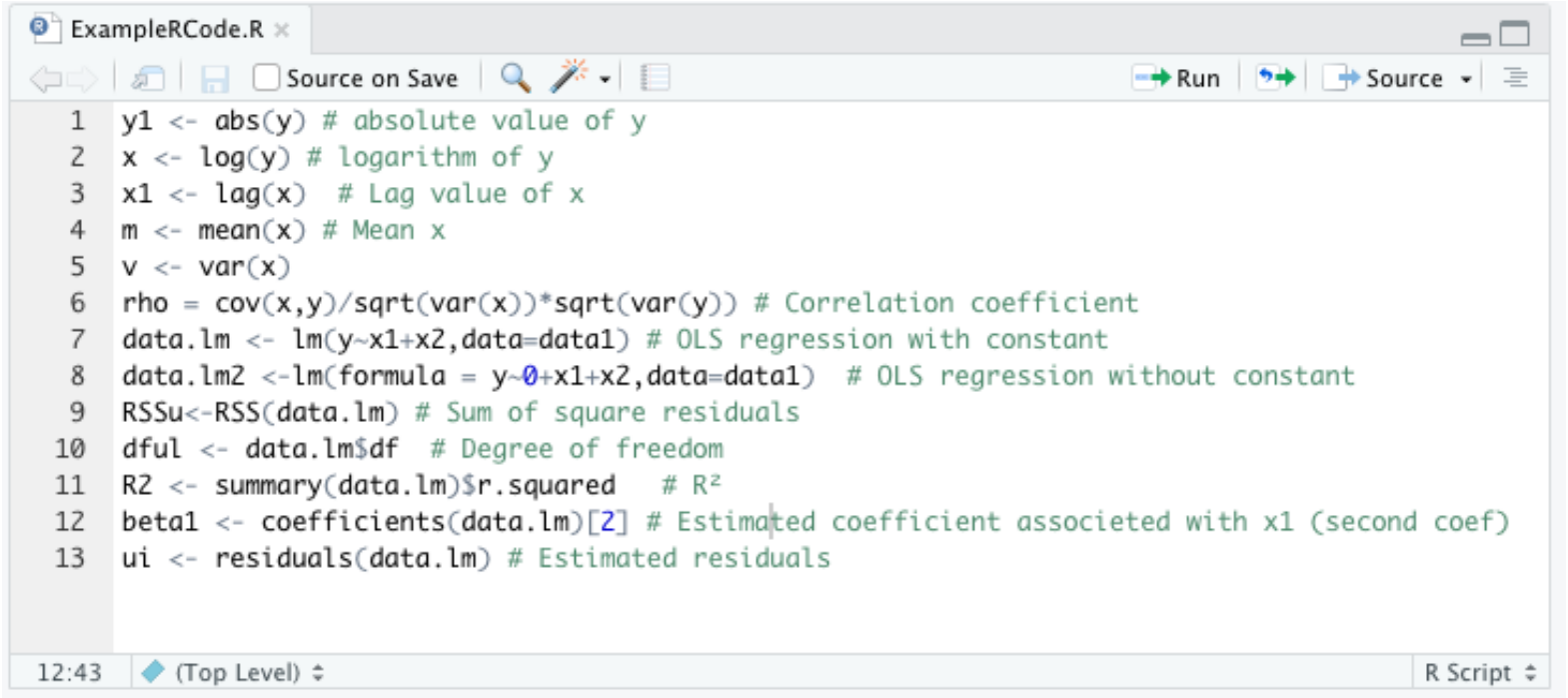


Figure : Command references

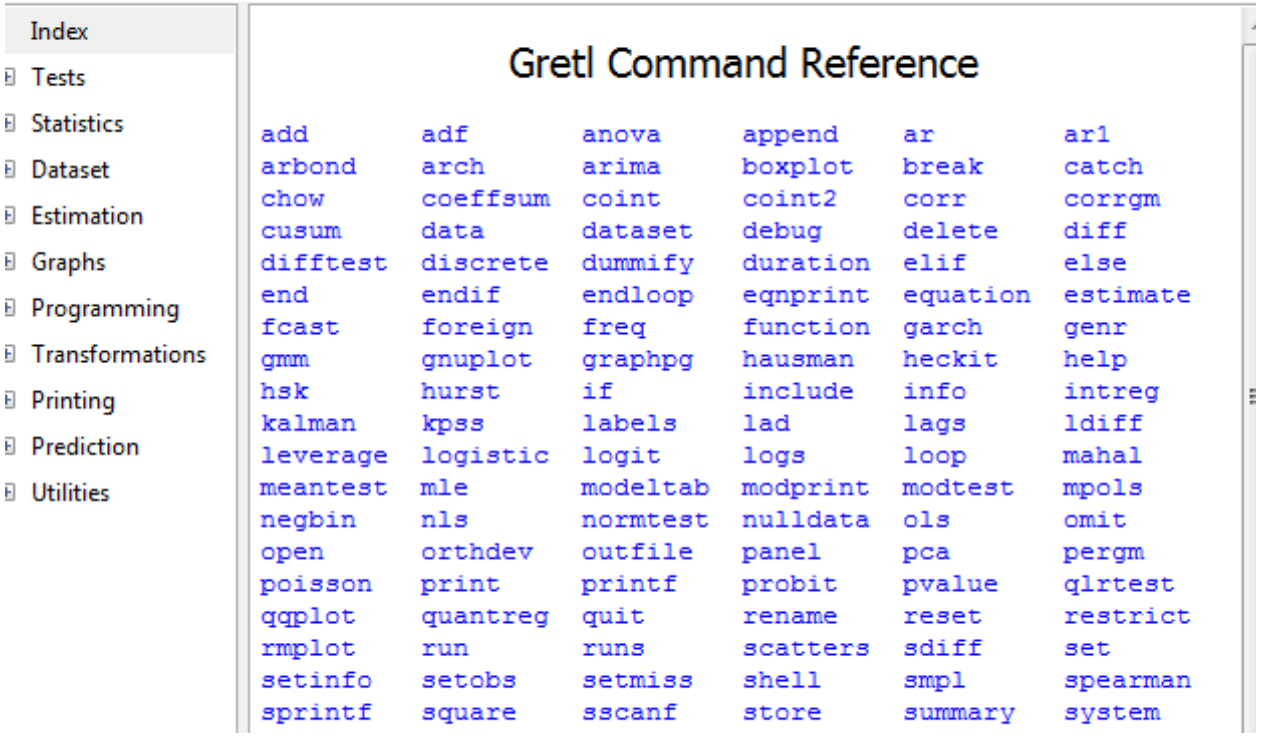
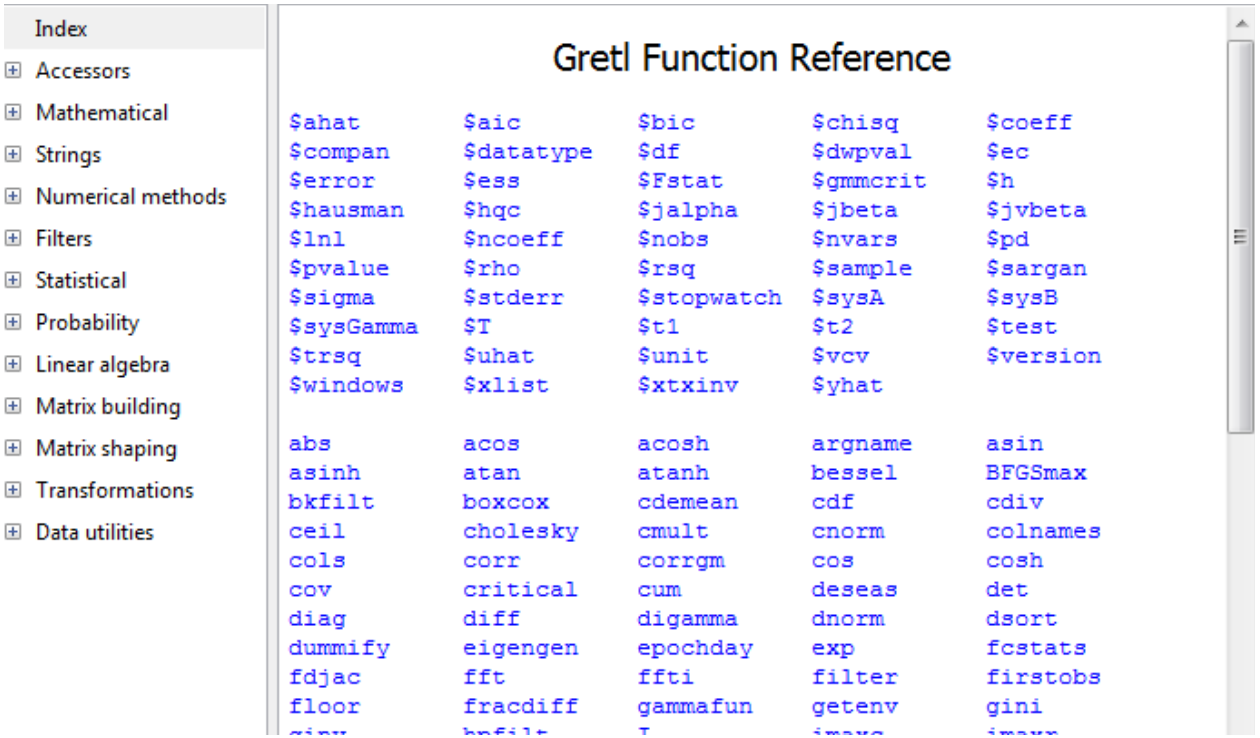


Figure : Function references

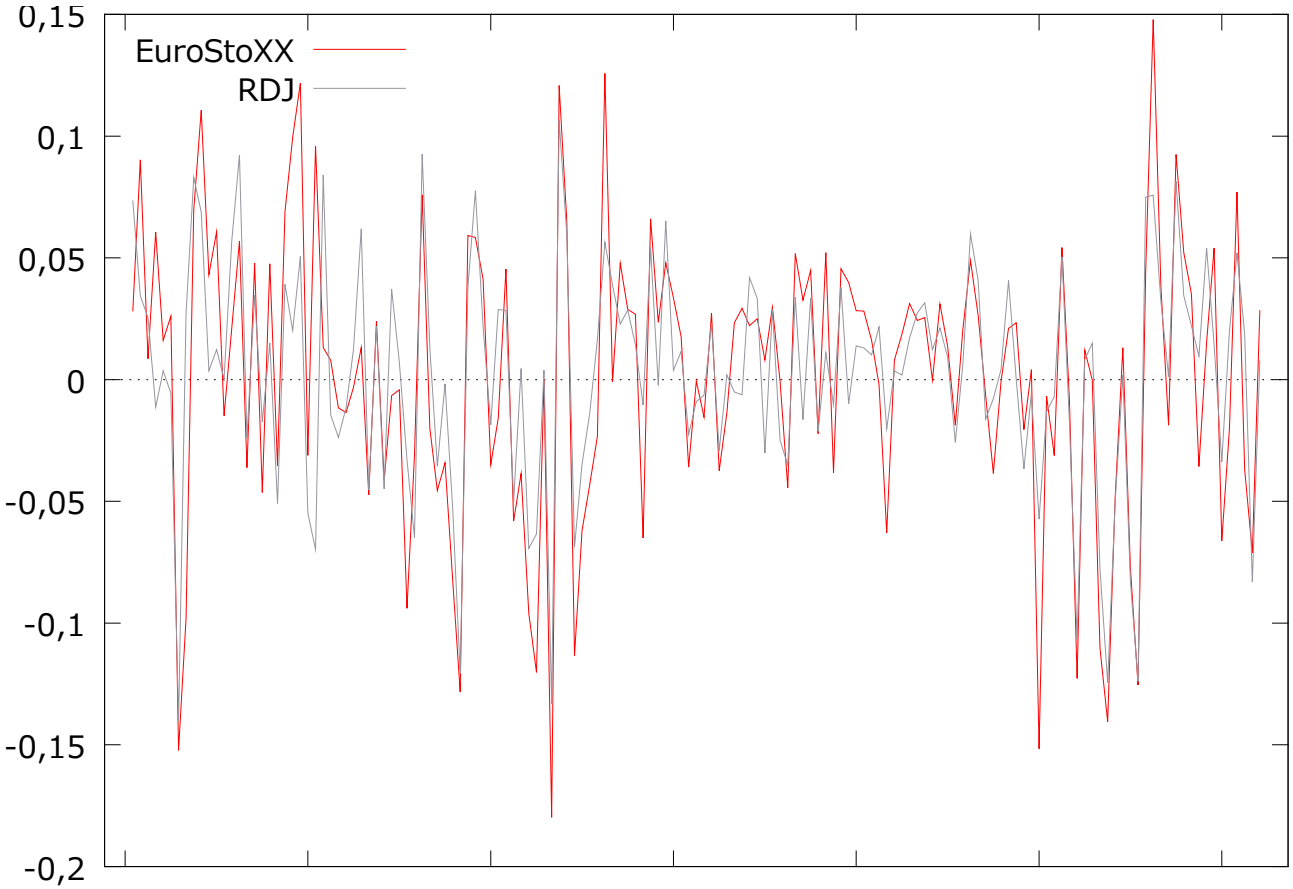


Does the Dow Jones Industrial index returns have an impact on the EurostoXX50 index return ? I

- Monthly return data are saved in worksheet Feuil3 of the files DowJones.xls and EuroStoXX50.xls.
  1. Import the first file under Gretl, define the date format and save it as a Gretl's data base.
  2. Import the second file under Gretl, define the date format and save it as a Gretl's data base.
  3. From the second file, append the data of the first file.
  4. Plot the two indexes evolutions.
  5. Make the scatter plot of REURO against RDJ.

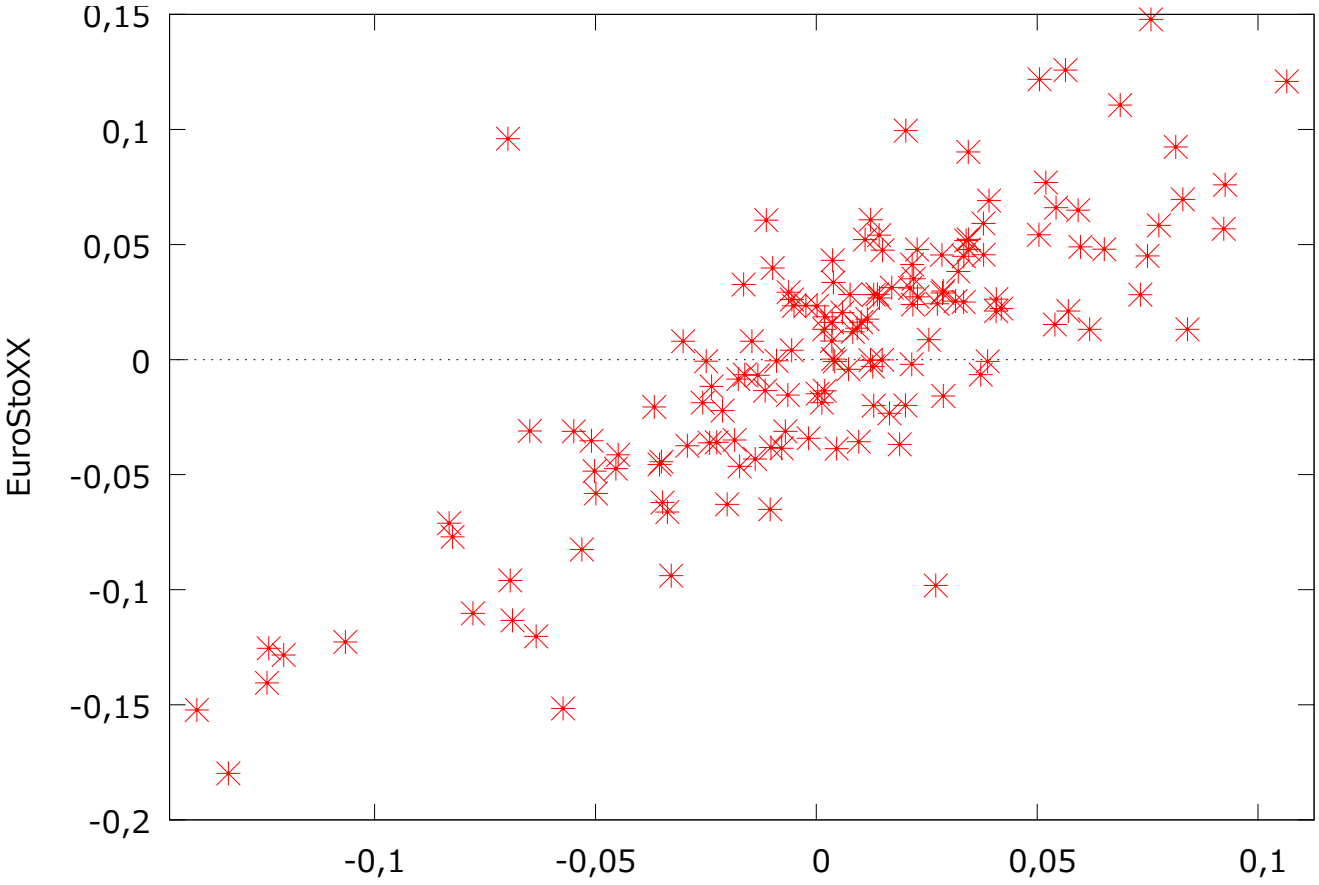
Does the Dow Jones Industrial index returns have an impact on the EurostoXX50 index return ? II

Figure : Dow Jones and EuroStoxx50 returns evolutions



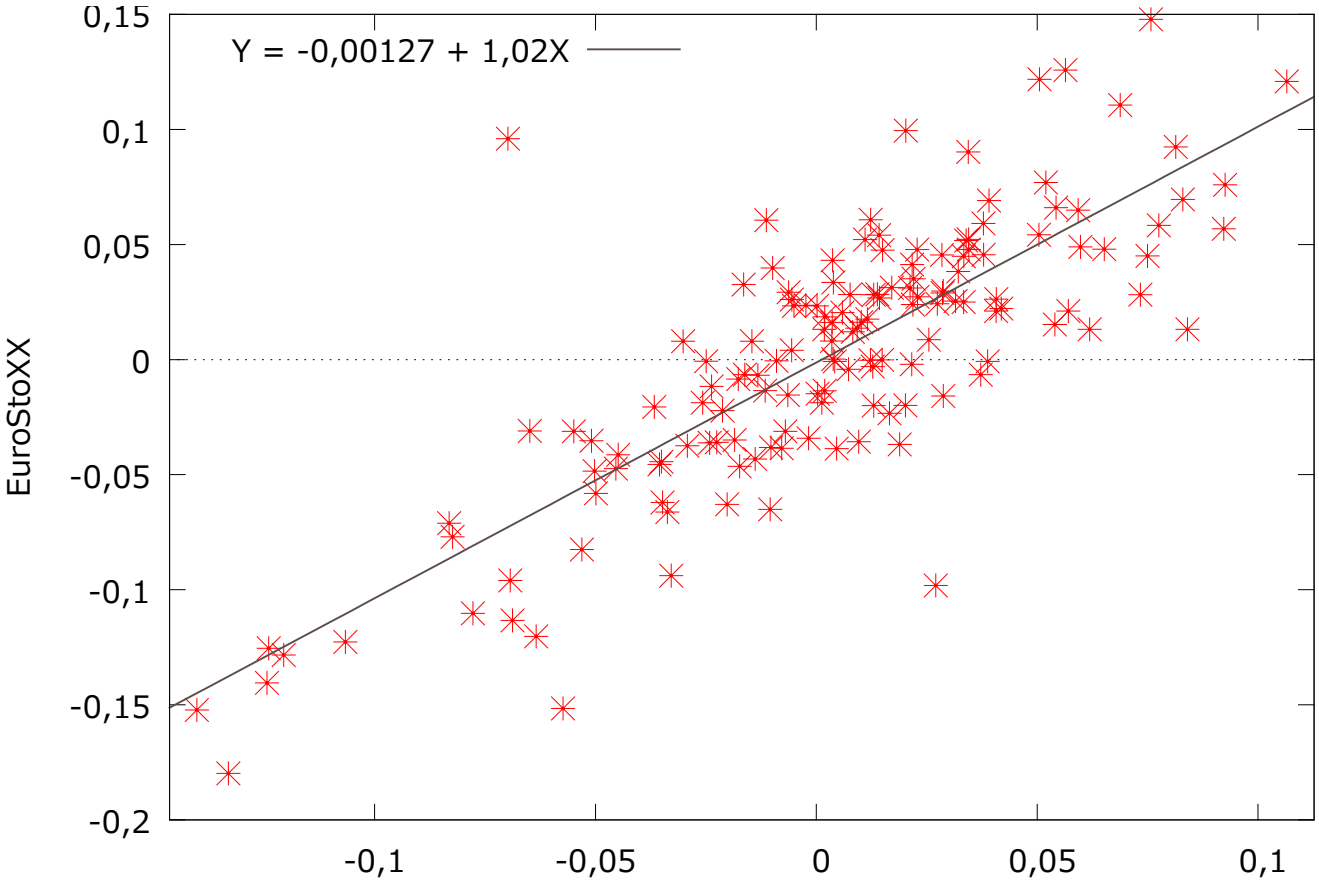
Does the Dow Jones Industrial index returns have an impact on the EurostoXX50 index return ? III

Figure : EuroStoxx50 against Dow Jones scatter plot



Does the Dow Jones Industrial index returns have an impact on the EurostoXX50 index return ? IV

Figure : EuroStoxx50 against Dow Jones scatter plot



Does the Dow Jones Industrial index returns have an impact on the EurostoXX50 index return ? V

- Construct the Dow Jones squared returns (RDJ2) and the cross returns Dow Jones - Eurostoxx (RDJREURO) :

```
genr RDJ2 = RDJ * RDJ
genr RDJREURO = RDJ * REURO
```

- Calculate the sum of these variables and print them

```
genr sumREURO = sum(REURO)
...
print sumRDJ sumREURO sumRDJ2 sumRDJREURO
```

Does the Dow Jones Industrial index returns have an impact on the EurostoXX50 index return ? VI

Summary	RDJ	$REURO$	$(RDJ)^2$	$RDJ \times REURO$
Sum	0,402352	0,223013	0,319466	0,326798

We can calculate, the estimated parameters from this summary : Equations

$$\hat{\beta}_0 =$$

$$\hat{\beta}_1 =$$

Does the Dow Jones Industrial index returns have an impact on the EurostoXX50 index return ? VII

Model 1 : OLS, using observations 1998 :02–2010 :06 ($T = 149$)
Dependent variable : REURO

	Coefficient	Std. Error	t-ratio	p-value
const	−0.00126992	0.00284956	−0.4457	0.6565
RDJ	1.02455	0.0615401	16.6485	0.0000

Mean dependent var	0.001497	S.D. dependent var	0.058786
Sum squared resid	0.177247	S.E. of regression	0.034724
R^2	0.653443	Adjusted R^2	0.651085
$F(1, 147)$	277.1725	P-value(F)	1.21e−35
Log-likelihood	290.2729	Akaike criterion	−576.5458
Schwarz criterion	−570.5379	Hannan–Quinn	−574.1049
$\hat{\rho}$	−0.021802	Durbin–Watson	2.029049