

# Group Essays: Subjects and Papers

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# Topic 1 – Matlab: practical work

## Matlab: practical exercise

**Question I.** Write a script code in order to have in the same figure the following three functions represented:

$$f(x) = 2x^2 + 4x + 6$$

$$g(x) = -4x + x^2$$

$$z(x) = -3 + f(x) - g(x)$$

with  $x$  defined in the interval  $[-2, 4]$ . Use different colors for representing each function in the same figure. Hint: You could just adapt the routine that was provided to you in classes (`par_script.m`) in order to answer this question

## Matlab: practical exercise (cont)

**Question II.** Assume the two following equations which represent the preferences/utility of two different economic agents concerning the pairs of unemployment ( $x$ ) versus inflation ( $y$ ), and tea ( $t$ ) versus oranges ( $c$ ):

$$z = f(x, y) = 5(0.5x^2 + 2y^2)$$

$$u = g(t, c) = 5t^{0.6}c^{0.4}$$

The two exogenous variables in  $f(x; y)$  are defined in the interval  $[-2, 2]$  with an increment step of 0.1; and defined in the interval  $[0, 4]$  for the function  $g(t, c)$ , with the same increment step.

## Matlab: practical exercise (cont)

**Question III.** Go to the Federal Reserve Bank of St. Louis, to FRED and download four time series. **Do not forget to choose all the time to download only "seasonally adjusted" data.** One related to a real GDP series (quarterly data), and another related to a monetary aggregate at your choice (quarterly data as well). And the last two should be: (i) a consumer price index series, and (ii) the unemployment rate. These two should have also quarterly observations. What you are requested to perform is the following:

- 1 Write a routine that graphically represents the four time series in 4 panels. **That is: 4 panels in 1 same figure.** Present the figure in the Word file.
- 2 Write a routine that compares the evolution (that is, the time series) of the unemployment rate and the inflation rate in a `plotyy`. Present the figure in the Word file.
- 3 Do the same for the other two time series.

## Matlab: practical exercise (cont)

**Question IV.** Present a script that is capable of showing the dynamics of the following stochastic process ( $x_t$ ):

$$x_{t+1} = a + bx_t + c\varepsilon_t$$

where  $\varepsilon_t$  is a IID random variable, with mean equal to zero and variance equal to 1. In Matlab this random variable is written as: `randn(1)`. The parameters are as follows:  $a = 2, b = 0.5, c = 1/10$ .

- 1 Simulate the dynamics of this process for  $t = [1, 80]$ .
- 2 Show the time series also for the random component of this process.

## Matlab: practical exercise (cont)– choose one of those below

**Question V.** Using the routine

"phillips\_script\_MasterNovember2012.m" that is attached to this link, and using the data you downloaded from FRED (about the rate of inflation inflation and unemployment rates) interpret the output that we get from running this routine.

**Question VI.** By adapting the routine "hpfilter\_script.m" (attached to this document) to your data file, obtain the Hodrick-Prescott filter for two of your time series (GDP and another one at your choice). Is this second variable procyclical or countercyclical? You should answer this question by looking at a cross plot of the two variables under consideration, which appears also in the output of the script above.

# Topic 2 – Ricardian Equivalence



# Ricardian Equivalence

- 1 Explain very carefully what is Ricardian Equivalence all about.
- 2 Explain very carefully the conditions under which Ricardian Equivalence does not hold.
- 3 Using the evidence/data in the following paper, what would you conclude about the relevance of this principle in the real world?



The McKinsey Global Institute, (2015). *Debt and (not much) Deleveraging*, London.

# Topic 3 – The sustainability of social security systems

# The Sustainability of Social Security Systems

- 1 Explain very carefully what are the two social security systems currently available.
- 2 Explain very carefully the conditions under which one of them is better than the other one.
- 3 Using the data from a country of your choice, what would you conclude about the sustainability of current social security systems?
- 4 Or using the evidence/data in the following paper, what would you conclude about the sustainability of current social security systems?



Craig S. Hakkio and Elisha J. Wiseman, (2006). *Social Security and Medicare : the impending fiscal challenge*, London.

# Topic 4 – Modern monetary policy

# Modern Monetary Policy

- 1 Explain very carefully what are the main principles that have guided monetary policy over the last 20 years.
- 2 Explain what are the major tasks and objectives of the European Central Bank.
- 3 Do you consider that the ECB has done a good job in achieving its main objectives? Explain carefully.
- 4 Why there has been so much controversy about the recent move of the ECB towards Quantitative Easing?