ICM142 – Programming for Finance
Spring 2017
Dr Andreas Chouliaras – Lecturer in Finance, ICMA Centre, Henley Business School, University of Reading
a.chouliaras@icmacentre.ac.uk

Deliverables

This course is graded based on an individual Programming/Empirical Finance project/assignment.

You should prepare a report using your knowledge from the course. The report should contain up to 2500 words (the word limit does not include references and tables) and it must be submitted electronically. Exceeding the word limit may be penalised. Programming code and output from any software you used in order to perform your calculations, can be pasted into the report (do not submit any other files rather than the report).

The deadline for submission of the assignment is **2pm, Friday 24th March 2017. An electronic submission on Blackboard must be made before this date and time**. Extensions to the deadline will only be given in very exceptional circumstances. Any such requests for an extension must be agreed by the ICMA Centre's Senior Tutor, Dr Konstantina Kappou (k.kappou@icmacentre.ac.uk), and must be accompanied by a completed extenuating circumstances form available from http://www.reading.ac.uk/internal/exams/student/exa-circumstances.aspx. Late submissions will be penalised according to University policy (https://www.reading.ac.uk/web/files/qualitysupport/penaltiesforlatesubmission.pdf).

As part of the submission process for the assignment, you are required to upload an electronic version of it to the Blackboard site. Reports must be submitted in one of the following formats: **Word or PDF** files. Follow the procedure below to submit your project, which must be submitted as **one** single file.

1. Go to http://www.bb.reading.ac.uk
2. Enter the login and password and click login.
3. **Click on Programming for Finance (2016/17)**
4. **From the left-hand menu, go to Assignments.**
5. **Click on View/ Complete under PFF Assignment**
6. You will see a box on the screen, as shown below:
   First name   Your first name will automatically default through
   Last name (Family name) Your Last name will automatically default through
   Submission Title   **Enter your submission title.**
   Please note that your title must include your Group number and full name followed by PFF_Project, e.g.
   Group_5_FirstName_LastName_PFF_Project
7. Click the **browse** button and select the file for your assignment on your computer (Remember that this must be one file only).
8. Click the **submit** button.
   The beginning of your assignment work will be shown on screen. Please check at this stage that you are submitting the correct file, as you are only allowed to submit one file.
   Note: All the formatting of your assignment is temporarily removed by Turn-It-In from the version shown on screen, and any Greek symbols and diagrams will disappear. Your assignment appears as a simple text file. Click the yes, submit button.

9. You will see on the screen a submission confirmation. You will also receive an e-mail from Turn-It-In UK confirming the receipt of your submission. Please keep this safe. This e-mail is also your **proof** of submission.
10. Log off. Click **log out** at the top of the screen.

Please note that only authorised ICMA Centre staff will be able to view the Turn-It-In report.

Assignment
Answer all parts of the following question. Marks allocated to each part in square brackets.

1) What were the key events of the Brexit? Create a timeline with the key dates and the key events. Which events happened on these key dates? [10]

2) What was the reaction of the UK stock market, the exchange rate (GBP to Euro, GBP to USD) and the sovereign bond yields on these dates? Did the stock market go up or down? By how much? What was the mean return on key events dates? What was the median? What was the standard deviation? Create a variable that takes the value 0 on days without key events and 1 on days with key events. Calculate the correlation between the key events variable and the behaviour of the stock market, the exchange rate and the sovereign bond yields. Perform a regression analysis between the previous variables. [10]

3) What was the reaction of the other major stock markets on the dates of these key events? Perform the analysis of 2) for the major stock markets of the world: USA, China, Japan, Germany, France, Italy, Russia. How do the stock markets of these countries perform when a key event is taking place in the UK? If there is a negative return for the UK stock market, what are the returns for the other stock markets? Are these returns negative as well? Or not? What is your explanation for what you observe? [10]

4) Perform the analysis of 2) and 3) up to -5 days before a key event date, and up to +5 days after a key event date. Plot the prices and returns of days T-5, T-4, T-3, T-2, T-1, T, T+1, T+2, T+3, T+4, T+5 for the stock markets, the exchange rates and the sovereign bond yields. What do you notice? Is there any movement in the markets before key event dates? Do financial markets react positively or negatively before, after, and on the days of key events? Repeat the steps 2) and 3) using cumulative returns from five days before the event to one day after the event. What do you observe? What happens if you consider the cumulative returns from five days before the event to three days after the event? What do you learn about the impact of these events? Comment on the sign and persistence of the information shock. [10]

5) Try to separate the key events into positive, negative and neutral. What is your rationale between splitting days into positive, negative, neutral? What is the reaction on the markets on such days? Is there any difference in the reaction of financial markets among days that you classify as positive/negative/neutral? How do the other financial markets in your sample perform on days that you classify as positive/negative/neutral? Do financial markets move in the same direction? Or in opposite directions? Do financial markets (for the UK and the other countries) react differently on days T-5, T-4, … , T, … , T+4, T+5 when "positive", "negative" or "neutral" events occur on day T? Are financial markets able to "forecast" whether the events of day T will be "positive", "negative" or "neutral"? Or do

they just react to events? To perform this analysis, you can calculate the returns on each of the days in the interval [T-5, T+5], but also the mean returns for these intervals. What is your explanation for what you observe? Create variables that take the values 0 in days (in the interval [T-5, T+5]) with positive events, and 1 in days with negative events, and calculate the correlations and a regression analysis between these variables and the returns of financial assets. [20]

6) Try to find some official announcements, interviews, and media coverage of the events of the key dates, as well as events in the days before and after the events took place. Try to study the text of some of these announcements. Were they bad (negative), good (positive) or neutral news events? How did you do such a classification? Justify your answer. Which words/phrases were used that were giving a positive/negative connotation? Create variables that take the values 0 in days (in the interval [T-5, T+5]) with positive news/announcements, and 1 in days with negative news/announcements (based on the words/phrases used in the text), and calculate the correlations and a regression analysis between these variables and the returns of financial assets. Create variables that contain the percentage of positive, negative, and pessimistic (negative minus positive) words in the articles of every day, and repeat the previous analyses. [20]

7) Perform a search on the research literature and in online software, in order to explore the various tools/algorithms that are used for textual sentiment analysis. Select the ones that you consider to be the most suitable, and, using these tools, construct financial sentiment indices based on these programming/software tools for sentiment analysis. Repeat the analysis of 6) using these algorithms. Compare and contrast the various algorithms and results. [20]

For all the above questions, you will need to write code in Python. Every operation of the above must be performed using Python functions and classes. You will need to respect the good programming practices such as commenting on your code so that it is clear (to you and other programmers that might read it) what it does.

Assessment Criteria

Your work will be assessed in terms of how well you have carried out the various parts of the Assignment, in terms of e.g., appropriate understanding of key notions discussed in class (programming code, functions, classes, commenting); correctness, clarity, completeness and relevance of your interpretations and commentaries.

The marks assigned to each part of the Assignment are given in square brackets at the end of each part.