**Assignment 2**

**FIN525, Spring 2019**

**Due: March 8th, Midnight**

## 1. Assignment details

In this project, you will be asked to compare the average stock performance of US companies during recessions and expansions. Please use the hypothesis testing tools we covered in class to answer the four questions listed below. For all questions, by "significantly", we mean with more than 99% confidence. This section outlines the analysis that you will need to perform, while the next section explains what you are expected to deliver.

- Data
  - Download the monthly stock file from CRSP. Keep the permno, date, ret and siccd variables. To ensure your analysis is not driven by outliers, delete observations with return higher than 100%.
  - Download the "NBER_Recession_Indicator" file from D2L (under Datasets). This contains a variable called "recession" which equals 1 if the economy was in a recession on that date and 0 otherwise. Merge this file into the CRSP data.
  - Download the "CRSP_SIC_FF12" from D2L. This assigns each SIC industry in CRSP to one of 12 sectors (also known as the Fama-French 12 industries). The file "Siccodes12" explains what the 12 sectors are. Merge the "CRSP_SIC_FF12" file into the CRSP file.

- Question 1: Do U.S. stock returns have significantly negative returns in recessions? Do they have significantly positive returns in expansions (non-recessions)?
  - Tip: formally test if the mean return in recessions is lower than 0 and if the mean return in expansions is higher than 0.

- Question 2: Do U.S. stocks have significantly lower returns in recessions than in expansions?
  - Tip: this is a two-sample t-test of difference in mean returns (Are these dependent or independent samples? Can we assume the variances are equal?)

- Question 3: Which of the 12 Fama-French sectors has the highest average return in recessions? Which sector has the lowest average return in recessions? Is the difference in average returns between the two sectors significantly different from zero?
  - Tip: calculate average returns by sector during recessions and report these averages in a table. Pick the best and worst performers and run a two-sample t-test of difference in mean returns. (Are these dependent or independent samples? Can we assume the variances are equal?)

- Question 4: Which Fama-French sector has the highest average return in expansions? Which sector has the lowest average return in expansions? Is the difference in average returns between the two sectors statistically significantly different from zero?
    - Tip: calculate average returns by sector during expansions and report these averages in a table. Pick the best and worst performers and run a two-sample t-test of difference in mean returns. (Are these dependent or independent samples? Can we assume the variances are equal?)

**2. Submission instructions**

You need to submit your SAS code and a written report on D2L before the deadline. Please see the details below:

1. On D2L, please upload a SAS file containing the code you used to generate your results (click on the NAME of this assignment on D2L, not on the attachment. That should take you to a screen where you can upload files).
    a. Make sure you comment your code properly. It should be very clear what you are doing by just reading your comments.
    b. If your code does not compile properly (i.e. if the log shows errors) you will lose 10% of your points so please make sure you check your log every time you run your code.
    c. The title of this file should have the following format: <Last names of group members, separated by underscores>_Assignment02. So, for example, if I did the project together with your TA, our file would be titled "Ion_Beggs_Assignment02".

2. On D2L, please upload a written report (either Word of PDF document) which includes a description of your analysis:
    a. Your report should have the following structure:
        i. Intro: a few sentences about what this analysis will cover
        ii. Data: a paragraph or two about your data sources, the filters you put on it and how you merged the datasets.
        iii. Results: Write a separate section for each of the four questions above (2-3 paragraphs per section). For each question, be clear about what your final answer is and how you got to that answer. For questions 3 and 4, do you have any ideas about what may be the economic forces driving your results?
        iv. Conclusion: Summarize the main findings of your analysis (1-2 paragraphs).
        v. Tables, if any (properly titled). If you report average returns by sector, please use the names of the sectors (e.g. Durables, Non-durables, etc.) not the sector codes (1,2, etc.)
        vi. Figures, if any (properly titled)
        vii. Appendix1: the SAS code you used to produce your results
    b. From intro to conclusion (excluding tables, figures and appendix), the report should be no longer than 4 pages, Times New Roman, one and a half line spacing, 12 pt font.

c. Tables should be exported and then formatted in excel (i.e. your SAS code should have a portion where you export results into excel). It is NOT OK to copy and paste SAS output.
d. Make sure your graphs are properly labeled so that it is easy to understand what is being plotted and what the axes are.
e. The formatting of your report accounts for 10% of your score. It needs to look professional and it needs to read as if you are explaining your results to your boss/client who may not know much about finance.

3. Please make one submission per group and make sure that the names of all the group members show up both in the SAS file and on the written report.

**IMPORTANT:** Please make sure you do not delete (of later modify) the data or code you used to produce your results. We might ask you to send it to us if we need to re-run your tests. Also, make sure you keep an electronic copy of the written report you hand in during class, just in case we lose your copy and need you to send us another one.

If you have any questions regarding the instructions above, please email me at mihaiion@email.arizona.edu.