Financial Econometrics - Homework 3

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1 Guidelines

- Deadline: Before May 10, 2019 by email to rombouts@essec.edu, oscarjoel.leonsandoval@essec.edu.
- If you use R, integrate your solutions into R-Markdown allowing you to embed the answers and code in one pdf file. if you use Python, make a Jypyter notebook file.
- Work in groups of 2.
- Explain the code making comments in each step of it.
- Professional presentation and visualisations are part of the evaluation.

2 how well can we explain daily stock excess returns with FF factors?

We inspire us by the paper of Eugene F. Fama and Kenneth R. French: A five-factor asset pricing model. Journal of Financial Economics 2015; 116 : 122. The daily data to 2019 can be found on this website::
https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html
(Fama/French 5 Factors (2x3) [Daily]).

One of the main question in finance is if there exist a model that can explain (not forecast) returns. The model used by Fama and French is:

$$r_t^i - R_{Ft} = \beta_0 + \beta_1(R_{Mt} - R_{Ft}) + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 RMW_t + \beta_5 CMA_t + \varepsilon_t \quad (1)$$

where the first 3 variables are the former Fama French factors proposed in the 1980s, and RMWt is the difference between the returns on diversified portfolios of stocks with robust and weak profitability, and CMAt is the difference between the returns on diversified portfolios of the stocks of low and high investment firms.
To do this homework, download from Yahoo Finance daily adjusted closing prices (from the earliest date available) for each stock in the S&P 500, transform them in percentage log returns. To do this find the ticker list of the S&P 500 index and loop over this list.

QUESTIONS:

1. Do a regression using the Fama french factors for each stock excess returns and store the estimated coefficients, the t value for the constant, and the R squared in a 500 x 8 matrix.

2. Compute descriptive statistics for each of the 8 columns.

3. Compute nonparametric density estimates for each the eight statistics (you have 500 values for each statistic) and make four plots. Add to the plots a normal distribution with mean and variance equal to the mean and variance of the variable plotted. Comment.

4. Sort the estimated constants and provide the names of the five companies with the highest constant and the five with lowest constant. Comment.

3 EXTRA FOR THE FAST (for fame only)

Redo the analysis for the monthly frequency returns and factors. Summarise your findings.