
Assignment 8

Problems

All exercises should be attempted. Unless stated otherwise, program your own procedures for computations relative to the course material (i.e., without relying on off-the-shelve packages/functions). There are 15 points allocated to the writing and coding styles.

Typed solutions in PDF format and Matlab/R source code should be emailed from your EPFL account (not a private account) to `suzanne.vissers@epfl.ch` by Sunday November 11, 2018 at 23:59.

Exercise 1. Structural break with the U.S. gasoline market data (30 points)

Consider the dataset and the model of exercise 5 in assignment 3. Using the full model containing the variables `INCOME`, `GASP`, `PNC`, `PUC`, `PPT`, `PD`, `PN`, `PS`, and `T`, test if there is a structural break in 1974 using the following approaches and comment:

- (a) include a dummy variable and perform a t -test;
- (b) perform an F -test.

Exercise 2. Farma–French regression (90 points)

The goal of this exercise is to apply the Farma–French regression to the US stock of your choice and to analyse the results.

- (a) Data download and processing
 - (i) Download the historical monthly time series of the Farma–French 3 factors for the period from January 1990 to December 2017 from Kenneth R. French’s data library (http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html). A description of the variables is available in the corresponding “Details” page.
 - (ii) Download the historical monthly price series of the S&P500 index and one of its constituents of your choice for the same period from Yahoo! Finance (<https://finance.yahoo.com/>).
 - (iii) Compute the monthly excess return series of the S&P 500 index and the stock of your choice by subtracting the risk-free rate in the Farma–French dataset from monthly returns.
- (b) Fit the model

$$R_t = \beta_0 + \beta_1 \text{Market}_t + \beta_2 \text{SMB}_t + \beta_3 \text{HML}_t + \epsilon_t,$$

where R_t denotes the excess return of the stock for the period t , Market_t is the excess return of the S&P 500 index, SMB_t and HML_t are the returns of corresponding Farma–French factors, and ϵ_t is a disturbance. Comment on the sign of the parameter estimates.

- (c) Compute standard errors and confidence intervals of the parameter estimates assuming homoscedasticity. Comment.
- (d) Inspect the time series of residuals and comment on the plausibility of the homoscedasticity assumption.

- (e) Perform a Breusch–Pagan test to assess the homoscedasticity assumption using the variables Market_t , Market_t^2 , SMB_t , SMB_t^2 , HML_t , and HML_t^2 .
- (f) Compute standard errors and confidence intervals of the parameter estimates assuming heteroscedasticity using White’s heteroscedasticity consistent estimator. Compare the results with those obtained when assuming homoscedasticity. Comment.