Financial Econometrics

May 17th 2017

Exercise 1 (3/10) Consider the following APT-style model:

$$r_A = \beta_0 + \beta_1 r_M + \beta_2 y + u$$

where r_A and r_M are excess returns on, respectively, an asset A and a market index, and y is the growth rate of industrial production.

You want to compare the above model with the reduced CAPM-like one:

$$r_A = \beta_0 + \beta_1 r_M + v$$

which you have in turn estimated, in order to choose your preferred one.

Which statistical test would you use? *(multiple answers are possible)*

1. specify the null and the alternative hypotheses
2. describe the testing procedure

Exercise 2 (4/10) Consider the linear model

$$y = \alpha + \beta_1 x_1 + \beta_2 x_2 + \varepsilon$$

1. Answer the following question: if you write the model in matrix form, as $y = X\beta + \varepsilon$, how is X formed?
2. Write the formula for the ordinary least squares estimator $\hat{\beta}_{OLS}$ in the above model
3. Derive the standard errors for the ordinary least squares estimator $\hat{\beta}_{OLS}$

Exercise 3 (3/10) Consider the regression

$$Y_t = \delta_0 + \delta_1 X_t + \varepsilon_t \tag{1}$$

A priori, you suspect nonstationarity in Y and X. Discuss how you would proceed (with particular attention to *caveats*, modelling choices, statistical tools at your disposal).