Financial Econometrics

May 18th 2015

Exercise 1 Consider the following APT-style model:

$$r_A = \beta_0 + \beta_1 r_M + \beta_2 y + \beta_3 \pi + u$$

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

You have been given a sample containing 50 data points and you have estimated the model by OLS. You are now interested in reducing the given model - if appropriate - and for this purpose you want to assess the joint significance of y and π. In other words, 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. Call the first model *unrestricted* (U) and the second one *restricted* (R). From estimation you have obtained the following quantities of interest:

- URSS the sum of squared residuals from model U
- RRSS the sum of squared residuals from model R

Which statistical test would you use?

Exercise 2 Consider a stock A and the market portfolio M. You have estimated a CAPM model of the excess returns r_A:

$$r_A = \alpha + \beta r_M + \varepsilon$$

resulting in $\hat{\alpha} = 0.4$, $\hat{\beta} = 1.5$ with standard errors, respectively, 0.6 and 0.2.

What is your best (point) forecast for r_A next year if the market grows by 6 *percent* and the risk-free rate is 2 percent?

Exercise 3 Consider the linear model

$$y = X\beta + \varepsilon$$

where the regressors $x_1, \ldots x_K$ are nonstochastic.

- Summarize the properties of the error term ε in the classical linear model.
- Show that the ordinary least squares estimator $\hat{\beta}_{OLS} = (X'X)^{-1}X'y$ is unbiased, highlighting which properties of ε does this result rest upon.