# Financial Econometrics

September 5th, 2018

**Exercise 1 (3/10)** Consider $y$ the sovereign spread of a country A vs. some "risk-free" country B (e.g., the excess returns of Italian BTPs vs. the German *Bund*).

You are interested in modelling the spread $y$ versus the *sovereign rating* of Country A by, say, Moody's ($x_1$) and three macroeconomic factors $x_2$, $x_3$ and $x_4$ (e.g., *growth*, *external balance* and *external debt*). You have observed a sample of quarterly data over 18 years (2000 to 2017) and estimated a model of the rating following Cantor and Packer (1996):

$$y_t = \beta_0 + \beta_1 x_{1t} + \beta_2 x_{2t} + \beta_3 x_{3t} + \beta_4 x_{4t} + \varepsilon_t$$

obtaining estimates $\hat{\beta}$ for the unknown parameters.

1. How would you test whether the sovereign rating $x_1$ adds anything to the macroeconomic factors $x_{2-4}$ in explaining the sovereign spread (i.e., if the analysts at the rating agency hold additional information)?

**Exercise 2 (3/10)** Consider the model from Exercise 1. As you know, in the Fall of 2011 there was a sovereign debt crisis. You are worried about the stability of your model before and after $\bar{t} = 3Q2011$.

1. Discuss how you would test for stability in your model, with particular respect to:
   - the null hypothesis $H_0$ and the alternative $H_A$
   - the construction of the test
   - the final decision rule

**Exercise 3 (4/10)** Consider the linear model

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

1. Derive the covariance matrix of the Ordinary Least Squares estimator $\hat{\beta}_{OLS}$, highlighting the hypotheses each step depends upon
2. Describe how you would calculate the standard errors from the above matrix.