Assignment Week 7 - Empirical Tests of the CAPM [1]

1. Simple test of the CAPM.

   Collect monthly data for American Express, Wal-Mart, Microsoft McDonalds, ExxonMObil, IBM and Nike. Seperately collect S&P data for the same period as the market portfolio. Use yearly data from the period 01011992 to 01012013 for the calculations below, that is:

   $$R_i = \log\left(\frac{x_{12i}}{x_{12(i-1)}}\right), \qquad \forall i \in Y = \{1, 2, .., 21\}$$

   where x_i is the adjusted close price at month i.

   1.1. Estimate average returns and covariance for the returns of the assets.

   1.2. Calculate the betas of each of the stocks against the S&P.

   1.3. Calculate a cross-section regression based on the following formula (taken of slide 7 of the lecture).

   $$\bar{R}_i = a_1 + a_2\beta_i + a_3 S_{ei}^2 + \epsilon_i$$

   1.4. What do you receive as a_1, a_2, a_3? Can you intemperate your results?

2. Roll's Critique.
   In this example we will demonstrate Roll's critique based on empirical data. (Roll's critique is simply that any test of the CAPM is a test if the market portfolio is efficient). Use yearly data for American Express, Wal-Mart and Microsoft based on the yearly data similar to question 2, but this time the period is between 01012002 to 01012013.

[1] Omri Ross October 21, 2015

2.1. Estimate average returns and covariance for the returns of the assets.

2.2. Assume the risk free rate is 2%. Calculate any two efficient portfolio of the 3 stocks (for example, you can take the highest slope portfolio or the efficient portfolio with expected returns of 5% or 8%)

2.3. Regress the returns of each of the 3 assets against each of your efficient portfolios.

2.4. Can you verify Roll's critique?

2.5. Pick a portfolio that has equivalent holdings of each of the risky assets. Repeat step 3.3. Is the result consistent with Roll's critique?