Topics in Asset Pricing

Assignment 5: Under- and over-reaction — To be submitted in pdf format to hombert@hec.fr before the beginning of the class on March 30th.

There are three dates \( t = 0, 1, 2 \). A risky asset is traded at \( t = 0 \) and \( t = 1 \) and pays off \( V = 1 + \epsilon \) at \( t = 2 \). Investors are competitive, risk neutral and have a zero discount rate. At \( t = 1 \), investors receive a public signal \( s \) about \( \epsilon \). The unconditional distribution of \( \epsilon \) has mean zero and the distribution conditional on the signal has mean \( E[\epsilon|s] = s \). Investors do not have rational expectations: denote investors’ forecasts by \( F[.] \). Investors have unbiased forecasts at \( t = 0 \): \( F[\epsilon] = F[s] = 0 \). But they update in a non-Bayesian way at \( t = 1 \):

\[
F[\epsilon|s] = (1 - \lambda)s,
\]
where \( \lambda < 1 \) may be positive or negative.

**Question 1** Which values of \( \lambda \) may be interpreted as under-reaction? over-reaction? rational expectations?

**Question 2** What is the equilibrium price at \( t = 1 \)?

**Question 3** What is the equilibrium price at \( t = 0 \)?

**Question 4** Calculate the (rational) expectation of the asset return between \( t = 1 \) and \( t = 2 \) as a function of \( \lambda \) and \( s \).

**Question 5** Calculate the (rational) expectation of the asset return between \( t = 1 \) and \( t = 2 \) as a function of \( \lambda \) and \( R_1 \).

**Question 6** When does the model predicts return momentum? return reversal? Explain the intuition in a few words.

**Question 7** Alice has data on \( N \) stocks whose returns are described by this simple model. The realization of \( s \) is i.i.d. across stocks. Alice runs the following linear regression in the cross-section of stock returns:

\[
R_{2,i} = a + b R_{1,i} + u_i \quad i = 1, \ldots, N.
\]

What is the expected value of the OLS estimate of \( b \)? [You will denote \( \kappa \equiv Cov(s, \frac{s}{1+(1-\lambda)s})/Var(s) \approx 1 \).]