Assignment Financial Econometrics

1. Unconditioned Estimation/Scaling Factors

In this task you will estimate CAPM and CCAPM with a scaled factor. The EViews file `data_cochrane_rawdata.WF1` provides the necessary data. For this exercise use the 25 Fama/French portfolios (s1b1 - s5b5), the market return `Mktexret` and the T-bill rate `rf`. As scaling factor `cay_t` use the standardized factor `cay1`. You have to generate this variable the following way: 

\[ cay1 = (cay - \text{mean}(cay)) / \text{stdev}(cay) \]

The stochastic discount factor is specified as:

\[
\text{CAPM: } m_{t+1} = a_1 + a_2 cay_t + b_1 R_{m,t+1} + b_2 (R_{m,t+1} \times cay_t) \\
\text{CCAPM: } m_{t+1} = a_1 + a_2 cay_t + b_1 \Delta c_{t+1} + b_2 (\Delta c_{t+1} \times cay_t)
\]

The moment conditions are collected in a vector:

\[
\begin{bmatrix}
E[m_{t+1}R_{e,1,t+1}] \\
\vdots \\
E[m_{t+1}R_{e,25,t+1}]
\end{bmatrix} = 0
\]

a) Estimate the unconditioned moment conditions.
   
   **Hint:** If excess returns are used you need to set \( a_1 = 1 \).

b) Compute and interpret the \( J_T \) statistic.
   
   **Hint:** When using EViews use *iterated* estimation and compute the \( J_T \)-statistic in the following way: \( J_T = J \cdot T \), where \( T \) is the number of observations.

c) Conduct the following test for joint significance \( H_0 : a_2 = b_2 = 0 \) and interpret the result.

d) Plot the estimated \( \{m_{t+1}\} \) sequence against time.

e) Plot the average excess returns vs. predicted excess returns.
   
   **Hint:** The predicted returns \( R^i \) for each return decile can be calculated from

\[
E(R^i) = \frac{1 - \text{cov}(m, R^i)}{E(m)}
\]

Predicted excess returns can be computed as:

\[
E(R^{e,i}) = -\frac{\text{cov}(m, R^{e,i})}{E(m)}
\]
2. Conditional Estimation

Now estimate CAPM and CCAPM using managed portfolios without scaling factors. Then the stochastic discount factors are:

\[
\text{CAPM: } m_{t+1} = a_1 + b_1 R^m_{t+1}
\]

\[
\text{CCAPM: } m_{t+1} = a_1 + b_1 \Delta c_{t+1}
\]

The moment conditions can be summarized in vector:

\[
\begin{bmatrix}
E[m_{t+1} R^e_{t+1}]

\vdots

E[m_{t+1} R^e_{t+1}]

E[(m_{t+1} R^e_{t+1}) cay_t]

\vdots

E[(m_{t+1} R^e_{t+1}) cay_t]
\end{bmatrix}
= 0
\]

Again, when using excess returns, set \(a_1 = 1\) for identification. To avoid a huge number of orthogonality conditions use a sub-sample of test assets for this and the following task:

\(s1b1_r, s1b3_r, s1b5_r,\)
\(s3b1_r, s3b3_r, s3b5_r,\)
\(s5b1_r, s5b3_r, s5b5_r\)

Now:

a) Estimate CAPM and linearized CCAPM using the conditional moment conditions.

b) Compute and interpret the \(J_T\) statistic.

c) Plot the average excess returns vs. predicted excess returns.

3. Conditional Estimation with Scaling Factors

In the third task we combine scaling from task 1 and managed portfolios from task 2.

a) Estimate CAPM and linearized CCAPM using the conditional moment conditions and scaling factors.

b) Compute and interpret the \(J_T\) statistic.

c) Plot the average excess returns vs. predicted excess returns.

d) Conduct the following test for joint significance \(H_0 : a_2 = b_2 = 0\) and interpret the result.