5th set GAUSS assignments Financial Econometrics

For convenience, collect all previously written and new procedures belonging to the estimation of asset pricing models in a source file which you include (`#include filename.src`) before you call the procedures in a separate program.

1. Test for joint significance

Estimate the Fama/French model with help of the GMM toolbox and the procedures developed in the 4th assignment. Are the coefficients of the Fama/French factors statistically significant different from zero? Use the estimated variance covariance matrix to compute an F-statistic for joint significance of the coefficients:

$$F \equiv (\mathbf{Rb} - \mathbf{r})'[\mathbf{R}\widehat{Var(\mathbf{b}|\mathbf{X})}\mathbf{R}']^{-1}(\mathbf{Rb} - \mathbf{r})/\#\mathbf{r}$$

where $\#\mathbf{r}$ is the dimension of $\mathbf{r}$ (number of restrictions).

Example: For the construction of the matrix $\mathbf{R}$ and the vector $\mathbf{r}$, suppose you have estimated the parameter vector $\mathbf{b} = (\ b_1 \quad b_2 \quad b_3 \quad b_4\ )'$ and want to test the joint hypotheses whether the true parameter $\beta_2 = \beta_3$ and $\beta_1 = 0$. Then, you can write the null hypotheses as a system of linear equations:

$$H_0 : \mathbf{R}\boldsymbol{\beta} = \mathbf{r}$$

In this example, it follows for $\mathbf{R}$ and $\mathbf{r}$:

$$\mathbf{R} = \begin{bmatrix} 0 & 1 & -1 & 0 \\ 1 & 0 & 0 & 0 \end{bmatrix}, \qquad \mathbf{r} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$$

2. Plot the time series of the stochastic discount factor

Estimate an asset pricing model of your choice and save the estimated coefficients in a vector. Write a GAUSS procedure which returns the time series of the stochastic discount factor for a specific asset pricing model (e.g. Fama/French, CAPM etc.). Then, use this procedure in a second procedure which plots the SDF series.

3. Plot the average excess return vs. predicted excess return

Estimate an asset pricing model of your choice and save the estimated coefficients in a vector. The predicted returns R^i for each return decile can be calculated from

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

Use the procedure which returns the SDF series together with the matrix of returns to compute the predicted mean returns for each return decile. Further, calculate the realized mean returns $\bar{R}^i$ for each return decile and collect them in a vector. Plot the realized mean returns on the x-axis versus the predicted mean returns on the y-axis. Draw an additional 45° line to provide an illustration how well the model fits the data. (*Look up the graphics syntax in the example program provided in* `gmmprocs.src`)