8th set GAUSS assignments Financial Econometrics

Create a new procedure file for today's procedures and the following procedures related to the estimation of trade indicator models (e.g. call it `timprocs.src`). Copy the `estimate_gmm` procedure (or however you named the general estimation procedure) into that procedure file. For convenience and a data description, you can also copy the `readdata` procedure provided in the procedure file on the homepage.

1. Estimating the Madhavan/Richardson/Roomans(1997) model

i) Write a procedures which returns the moment conditions implied by the MRR model. In the GAUSS files `ads_tim.fmt`, `bmw_tim.fmt` and `dcx_tim.fmt` you find trade data for the three stocks over a period from 1st February 2004 to 10th February 2004. The estimable equation which can be derived from the theoretical MRR framework reads as:

$$\Delta p_t = \theta(Q_t - \rho Q_{t-1}) + \phi \Delta Q_t + u_t$$

and implies the following moment conditions:

$$E \begin{bmatrix} Q_t Q_{t-1} - \rho \\ u_t \\ u_t Q_t \\ u_t Q_{t-1} \end{bmatrix} = 0$$

where Q_t is a trade indicator taking the value 1 if the trade is a buy and -1 if the trade is a sell. Δp_t is the price change from period $t-1$ to t.

ii) Write a procedure which returns the standard error for the implied spread $s_E = 2(\phi+\theta)$ and the asymmetric information share $r = \theta/(\theta+\phi)$. Use the delta method to compute the standard errors:

Suppose that $\{\mathbf{x}_n\}$ is a sequence of K-dimensional random vectors such that $\mathbf{x}_n \xrightarrow{p} \boldsymbol{\beta}$ and

$$\sqrt{n}(\mathbf{x}_n - \boldsymbol{\beta}) \xrightarrow{d} N(\mathbf{0}, \boldsymbol{\Sigma})$$

then

$$\sqrt{n}(\mathbf{a}(\mathbf{x}_n) - \mathbf{a}(\boldsymbol{\beta})) \xrightarrow{d} N(\mathbf{0}, \mathbf{A}(\boldsymbol{\beta})\boldsymbol{\Sigma}\mathbf{A}(\boldsymbol{\beta})')$$

where $\mathbf{A}(\boldsymbol{\beta})$ is the matrix of continuous first derivatives of $\mathbf{a}(\boldsymbol{\beta})$ evaluated at $\boldsymbol{\beta}$:

$$\mathbf{A}(\boldsymbol{\beta}) = \frac{\partial \mathbf{a}(\boldsymbol{\beta})}{\partial \boldsymbol{\beta}'}.$$

Hint: Look in the GAUSS help how the `gradp` function works.

iii) Estimate the model for all three stocks and save your results in a matrix. Note, that if you want to add information having character format you have to convert your numeric values first since mixed matrices (numeric and character) are not allowed in GAUSS.