10th set GAUSS assignments Financial Econometrics

The GAUSS code `evntst.g` for this assignment sheet is based on chapter 5 and 6 of the book "Using SAS in Financial Research", written by Boehmer, Broussard, Kallunki (2002) and partly on chapter 4 of "The Econometrics of Financial Markets" from Campbell, Lo, MacKinlay (1997). The data set `returns.dat` contains the event date (evntdate), return data (ret), market return data (mrktret), a date variable (dat), a dummy variable for positive or negative earnings announcements (evntdum) and a firm indicator (firm).

1. Event study analysis

i) First, take a look how the data are structured. Therefore, read in the data from the file `return.dat`. You can use the read in steps from the program `evntst.g`. Create an indicator variable which takes the value 1 if the date in the date column is less than the event date and 0 otherwise.

ii) Then, write a procedure which conducts OLS estimation and returns the estimated parameters as well as the estimated error variance (or standard deviation).

iii) The following steps are done for each stock and each event separately:
   1. Determine the estimation period and select the sub-matrix belonging to this period.
   2. Then, estimate the market model with your OLS procedure:
      \[ R_{it} = \alpha + \beta R_{mt} + \varepsilon_t \]
   3. Determine the event period (take a look in the example program) and select the sub-matrix belonging to the event period.
   4. Use your estimated parameters to calculate abnormal returns in the event period:
      \[ \hat{AR}_{i\tau} = R_{i\tau} - \hat{\alpha} + \hat{\beta} R_{m\tau} \]
   5. Compute cumulative abnormal returns: \( \hat{CAR}_i = \sum_\tau \hat{AR}_{i\tau} \) and the variance of the CAR:
      \[ \hat{Var}(CAR_i) = \gamma'\hat{V}_i\gamma \]
      where
      \[ \hat{V}_i = \hat{\sigma}_\varepsilon (I + X'_i(X'_iX_i)^{-1}X'_i) \]
      \( X'_i \) is the data matrix from the event period and \( X_i \) is the data matrix from the estimation period. \( I \) denotes the identity matrix and \( \hat{\sigma}_\varepsilon \) is the error variance.
   6. Compute the standardized cumulative return:
      \[ \hat{SCAR}_i = \frac{\hat{CAR}_i}{\sqrt{\hat{Var}(CAR_i)}} \]
      ....TO BE CONTINUED