4th set SAS assignments

1. Event Studies in SAS I

This assignment is based on chapter 5 and chapter 6 in Boehmer/Broussard/Kallunki (2002)
Use the data sets prepared in last week's session.

i) Estimate the market model in the estimation period for each firm-event date combination, i.e regress the daily stock returns on a constant and the market returns: $R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it}$. Use `PROC Reg` .

ii) Compute abnormal returns and cumulative abnormal returns in the event period with help of your estimated parameters from the market model. First use a data step to merge the parameter estimates to the event period data and then calculate abnormal returns: $AR_{it} = R_{it} - \hat{\alpha}_i - \hat{\beta}_i R_{mt}$. Moreover, compute the variances of the estimation period abnormal returns ("PROC Reg" automatically generates the variable *_rmse_* (Root mean squared error) which can be squared to return the variance). Use `PROC Means` to calculate the cumulative abnormal returns.

iii) Sort the data by the event dummy variable. Calculate the mean, t-test and the p-value for the overall cumulative abnormal returns (i.e. the null hypothesis is that they equal zero). Then conduct the same tests for cumulative abnormal returns associated with negative (positive) events only. (Hint: t-tests and p-values are implemented in `proc means`). Interpret your results. Are the effects of the events significant?

vi) Use a data step to compute event period abnormal returns, which are standardized by the standard deviation of the estimation period abnormal returns (i.e. divide the event period returns by the square root of the estimation period abnormal return variance times the number of days in the event period).

v) Finally compute the Patell's t-statistic:
$t_{patell} = \frac{\sum_{i=1}^{N} SR_i}{\sqrt{N}}$
First calculate the mean over the standardized cumulative abnormal returns as well as the number of observations using `proc means` with the event dummy as a by variable. Then calculate the statistic which can be obtained as the average standardized cumulative abnormal return multiplied by the square root of the number of events in the

portfolio. Have a look at the results. What do you conclude? What is the idea behind the standardization of the abnormal returns?

v) ADDITIONAL TASK: The event window we chose might actually be too short. Therefore it would be of interest to conduct an event study using a different event window. Rewrite your program into a macro that keeps the length of the event period flexible. Call the macro for different event windows.