4th Assignment: Event Studies in SAS

The next assignment is based on chapter 5 in Boehmer/Broussard/Kallunki (2002).

1. Data Preparation

i) Have a look at the data set `returns.sas7bdat`. Figure out the structure of the data. Create a dummy variable named *before* taking the value 1 for all days before the corresponding event (i.e. for date<evntdate).

ii) Sort the data by firm, event date and date. Use `Proc Means` to compute the number of days before the event date for each firm and each event (name the variable `bef_sum` and use the `sum` option in the output statment of `Proc Means`). Merge this variable back to the original data and drop the variable *before*.

iii) Compute a (negative!) counter (name it `relday`) returning the day relative to the event date (event date should be zero). Use a data step and an if statement:

```
by firm evntdate;
if first.evntdate then relday=-bef_sum-1;
relday+1;
```

iv) Split the data set into estimation (returns on 110 trading days before the event) and event periods (returns on the day before the event day and the event day (day 0) . Again use a data step and an if statement.

2. Estimation

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). 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?

iv) 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 days in the event period (use a data step). Have a look at the results. What do you conclude? What is the idea behind the standardization of the abnormal returns?

vi) Use the `ODS pdf` statement (SAS help) to write the table containing Patell's t-statistic to a pdf file which is saved in your home folder.

vii) 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.