Roychowdhury’s Real Activities Manipulation Model

Important Notice!

Important conditions for the estimations of the models!

- I eliminate firms in regulated industries (SIC codes between 4400 and 5000) and banks and financial institutions (SIC codes between 6000 and 6500). The two-digit SIC code is used to identify an industry.

- The model for normal or expected CFO is estimated by every year and industry. I require at least 15 observations for each industry-year grouping.

Cash Flow From Operations

This variable can be downloaded from, for example Compustat (Roychowdhury, 2006). To estimate the model, I run the following cross-sectional regression for every industry and year:

**Step 1: Estimate the model:**

$$\frac{CFO_t}{A_{t-1}} = \beta_0 + \beta_1 \frac{1}{A_{t-1}} + \beta_2 \frac{S_t}{A_{t-1}} + \beta_3 \frac{\Delta S_t}{A_{t-1}} + \varepsilon_t$$  \hspace{1cm} (Eq. 1)

Where,

- $CFO_t$ = Cash flow from operations in year $t$,
- $A_{t-1}$ = Total assets in year $t - 1$,
- $S_t$ = Total sales in year $t$,
- $\Delta S_t$ = $S_t - S_{t-1}$, so sales in period $t$ minus sales in period $t - 1$,
- $\beta_0, \beta_1, \beta_2,$ and $\beta_3$ = Parameters to be estimated, namely the betas,
- $\varepsilon_t$ = Residuals in year $t$. 

So how do I calculate the coefficients $\beta_0$, $\beta_1$, $\beta_2$, and $\beta_3$?

Coefficients, parameters or betas are estimated by means of an ordinary least squares regression (OLS). This is shown in the video tutorial. After we know what the coefficients are, you denote these as $\beta_0$, $\beta_1$, $\beta_2$ and $\beta_3$. These are the estimated coefficients or betas.

Step 2: Calculate the abnormal cash flow from operations:

For every firm-year combination, the abnormal cash flow from operations is the actual CFO minus the “normal” CFO calculated using estimated coefficients from the corresponding industry-year model and the firm-year’s sales and lagged assets. **You don’t need the formula below to calculate the abnormal cash flow from operations. In the video I show a much faster method to calculate this.**

\[
abnCFO_t = \frac{CFO_t}{A_{t-1}} - \beta_0 - \beta_1 \frac{1}{A_{t-1}} - \beta_2 \frac{S_t}{A_{t-1}} - \beta_3 \frac{\Delta S_t}{A_{t-1}}
\]  

(Eq. 2)

That's it for abnormal cash flow from operations!