FIN 3080 Investment Analysis and Portfolio Management

Spring 2023 | CUHK (SZ)

Assignment V

Due: 23:59, May 12, 2023

Tips

- Please reserve at least one hour for submission. Late submission without justification is not acceptable.

- A complete submission shall be a compressed package named with "YourID_YourName" containing (i) one readable PDF file (1.5-spaced, 11pt, no greater than 5 pages) with your, if any, arguments, tables and figures, and (ii) one or many code files that generate the empirical results.

- This homework is on individual basis and each student shall submit her or his own solution. You may discuss with your fellows but plagiarism and fabrication are strictly prohibited.

- You may not use Excel for data analysis and you may not plot figures by hand.

Problems

Post Earning Announcement Drift (PEAD) is one of the most classical phenomena in asset pricing. It describes the inertia for a stock's cumulative abnormal returns to drift in the same direction of an earnings surprise following earnings announcements. Let us apply the event study framework introduced in the lecture, to examine whether the PEAD exists in China's A-share markets. The following instructions detail an empirical strategy that regrads the release of semi-annual and annual earning per share announcements as events, and specifies time periods from the 120_{th} trading days before announcements to the 120_{th} trading days after announcements as event windows.

1. EPS data preprocessing

Step 1.1 Download quarterly records on "*Earnings per Share 1*" for all stocks listed on the mainboard over 2013Q1 to 2022Q4 from "*China Listed Firms Research Series - Financial Indicators - Index per Share*".

Step 1.2 Exclude parent statements.

Step 1.3 Keep semi-annual and annual reports (i.e., reports with "*Ending Date of Statistics*" of "YYYY/6/30" and "YYYY/12/31") only and collapse data from firm-quarter panel into firm-semi-annual panel. Then replace earnings per share over the second half of each year as the difference between earnings per share as of Q4 and Q2 in that year.

Step 1.4 Derive unexpected earnings (UE). The unexpected earning for company i at time t is given by

$$UE_{i,t} := EPS_{i,t} - EPS_{i,t-2}.$$

Step 1.5 Derive standardize unexpected earnings (SUE). The standardize unexpected earning for company i at time t is give by

$$SUE_{i,t} := \frac{UE_{i,t}}{\sigma_{i,t}},$$

in which $\sigma_{i,t}$ is the standard deviation of $\{UE_{i,t-3}, UE_{i,t-2}, UE_{i,t-1}, UE_{i,t}\}$.

Step 1.6 Derive SUE deciles for firms by accounting dates.

Step 1.7 Download statement announcement dates over 2013/1/1 to 2022/12/31 from *"China Listed Firms Research Series - Statements Release Dates"*

Step 1.8 Merge announcement dates to the EPS data set on accounting dates and stock codes. Exclude firms with *"ST"* or *"PT"*.

2. Stock return data preprocessing

Step 2.1 Download (i) daily individual stock return data over 2013/1/1 to 2022/12/31 from *"China Stock Market Series - Stock Trading - Individual Stock Trading"*, and (ii) daily market return data over 2013/1/1 to 2022/12/31 from *"China Stock Market Series - Stock Trading - Aggregated Market Trading"*.

Step 2.2 Exclude non-mainboard stocks.

Step 2.3 Merge market return data to individual stock data on Year-Month-Day dates.

Step 2.4 Derive daily abnormal returns (ARs). The daily abnormal return for firm i at time t is given by

$$AR_{it} := r_{it} - r_{mt},$$

in which r_{it} is firm i's stock return at time t and r_{mt} is the market return at time t.

3. Main analysis

Step 3.1 Merge earnings per share data to individual stock return data.

Step 3.2 Derive (simple) cumulative abnormal returns (CARs) for individual stocks. The cumulative abnormal return for firm i over $[t_1, t_n]$ is given by

$$CAR_{i,[t_1,t_n]} = \sum_{j=1}^{n} AR_{i,t_j},$$

in which $AR_{\cdot,\cdot}$ is the abnormal return obtained from Step 2.4. For each firm's each EPS announcement event since 2015, we consider a 241-day window starting from the 120 days before the announcement and 120 day after the announcement (denoted by $[-120, 120]$), and derive CARs at each trading day within these windows.

Step 3.3 Derive CARs for *SUE* portfolios. For each announcement event, calculate the portfolio CARs as the simple average of CARs of individual stocks within the portfolio. [Hint: the portfolio index for each event is exactly the *SUE* decile obtained from Step 1.6.]

Step 3.4 Aggregate CARs within *SUE* portfolios on event time index. Within each portfolio, take the mean of CARs with respect to event time index to obtain a single CAR time-series. Ideally, you generate a figure similar with fig. 1. [Hint: see Remark 2 for illustrations of the concept of "event time index".]

Remark

1. You may find it helpful to quickly scan Bernard and Thomas (1989) before getting hands dirty.

2. Accounting dates determine the period for which earnings per share are calculated within a fiscal year. For example, ZYXY (603126) reports an EPS of 0.5653 in a report with accounting date of 2021/6/30, suggesting that the ratio of net profit over [2021/1/1, 2021/6/30] and number of tradable shares for this company is about 0.5653. Announcement dates refer to the real date when the statement is actually released. Continuing with the previous example, ZYXY released that report at 2021/8/31 and that is when investors start to perceive the performance of ZYXY over [2021/1/1, 2021/6/30].

3. In an event window of $[-120, 120]$, dates can be re-indexed from -120 to $+120$ and typically, the event date is usually indexed as zero. For example, assume a statement is released at 2021/8/31, then the event time index for 2021/8/31 is 0, for 2021/8/30 is -1, for 2021/8/27 is -2 and so on. From this point of view, EPS announcements can be deemed as the results from resampling homogenous events yet with different levels of *SUE* for many times.
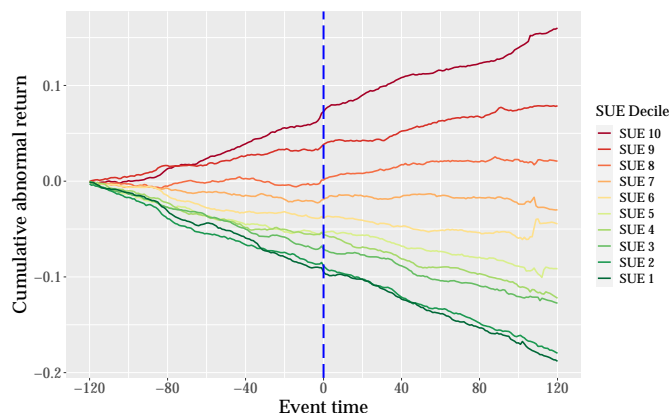
Expected outcomes

Figure 1: Cumulative abnormal returns by *SUE*

References

Bernard, Victor L and Jacob K Thomas (1989). "Post-earnings-announcement drift: delayed price response or risk premium?" In: *Journal of Accounting research* 27, pp. 1–36.