FIN 3080 Investment Analysis and Portfolio Management

Spring 2024 | CUHK (SZ)

Assignment IV

Due: 23:59, May 6, 2024

Disciplines

- A delayed or incomplete submission before the suggested solution is released will result in a deduction of few points. No submission or submission after the suggested solution is released will result in a deduction of all points.
- A complete submission must include two files: (i) a typed PDF file (1.5-spaced, 11pt, no longer than 5 pages) including your arguments, tables and figures in English (excluding your codes), and (ii) a compressed package named "YourID_YourName" containing one or multiple code files that generate the empirical results in your PDF file.
- You may discuss with your peers but plagiarism and fabrication are strictly prohibited and will be directly reported to the Registry Office.
- You may choose any programming languages to finish the assignment. Excel is not considered as a programming language.

Problem

Post Earnings Announcement Drift (PEAD) is one of the most well-established phenomena in asset pricing. It describes the tendency for a stock's cumulative abnormal returns to continue drifting in the same direction as an earnings surprise revealed from earnings announcements. Let us apply the event study framework introduced in the lecture to examine whether PEAD exists in China's A-share markets. The following instructions outline an empirical strategy that treats the release of interim (semi-annual) and annual earnings per share announcements as events, and specifies time periods from the 60th trading day before announcements to the 60th trading day after announcements as event windows.

1. Individual stock return data preprocessing

   Step 1.1 Download *stock code, trading date, daily return without cash dividend* for all A-share stocks over 2016/1/1 to 2023/12/31 from *China Stock Market Series/Stock Trading/Individual Stock Trading* table.

   Step 1.2 Convert *trading dates* into year-month-day dates, e.g., *29jan2014*.

2. Market return data preprocessing

Step 2.1 Download daily *trading date, market type, daily market return without cash dividend (equal-weight)* for all A-share stocks over 2016/1/1 to 2023/12/31 from *China Stock Market Series/Stock Trading/Market Trading* table.

Step 2.2 Keep records for *SSE A share market (excluding STAR Market)* based on *market type*.

Step 2.3 Convert *trading dates* into year-month-day dates, e.g., *29jan2014*.

3. EPS data preprocessing

Step 3.1 Download quarterly records on *stock code, stock short name, earnings per share 1, code for statement type, industry code, ending date of statistics* for all A-share stocks over 2014Q1 to 2022Q4 from *China Listed Firms Research Series /Financial Indicators/Index per Share* table.

Step 3.2 Exclude parent statements based on *code for statement type*.

Step 3.3 Exclude *ST* and *PT* companies (i.e., companies with *stock short name* starting with "ST " or "PT ").

Step 3.4 Exclude finance companies based on *industry code*.

Step 3.5 Keep interim and annual *earnings per share* records (i.e., records with "*ending date of statistics*" in the format of "YYYY/6/30" and "YYYY/12/31").

Step 3.6 Convert *ending date of statistics* into half-yearly dates, e.g., *2016h1, 2016h2*.

Step 3.7 Specify the data set as a company-half-year panel with *stock code* and *ending date of statistics*.

Step 3.8 For each company, replace *EPS* over the second half of each fiscal year as the difference between *EPS* at the second half of that year and *EPS* at the first half of that year. [Note that *earninghs per share 1* is cumulative within a fiscal year.]

Step 3.9 Derive unexpected earnings (UE). The unexpected earning for company i at time t is given by

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

i.e., the difference between current *EPS* and *EPS* for the same period last year.

Step 3.10 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 3.11 Derive SUE deciles for each firm by *ending date of statistics*. [Note that each *ending date of statistics* corresponds to an *EPS* annoucement event].

Step 3.12 Keep *stock codes*, *ending date of statistics*, *SUE deciles*.

Step 3.13 Transform the data set from a company-half-year panel into a firm cross-sectional data set such that each *ending date of statistics* has a corresponding *SUE decile* column. In other words, you reshape the "long" data set into a "wide" data set.

4. Announcement data preprocessing

Step 4.1 Download quarterly *annoucement dates* for all A-share stocks over 2016Q1 to 2022Q4 from *China Listed Firms Research Series /Statements Release Dates* table.

Step 4.2 Keep interim and annual records based on *report type*.

Step 4.3 Structure the data set as a company-year-half panel specified by *stock code* and *ending date of statistics*.

Step 4.4 Transform the data set from a company-year-half panel into a firm cross-sectional data set such that each *ending date of statistics* has a corresponding *announcement date* column. Again, you reshape the "long" data set into a "wide" data set.

5. Data merging

Step 5.1 Load processed individual stock return data obtained from *Step 4.2*.

Step 5.2 Merge processed *market return* data obtained from *Step 2.3* to the data under processing on *trading date*.

Step 5.3 Merge processed *SUE decile* data obtained from *Step 3.13* to the data set under processing on *stock code*.

Step 5.4 Merge processed *announcement* data obtained from *Step 4.4* to the data set under processing on *stock code*.

6. Event study

Step 6.1 Load the data set obtained from *Step 5.4*.

Step 6.2 Derive daily abnormal returns (ARs). The daily abnormal return for company i at time t is given by

$$AR_{i,t} := r_{i,t} - r_{m,t},$$

in which $r_{i,t}$ is the individual stock return for company i at t, $r_{m,t}$ is the market return at t.

Step 6.3 For each *EPS* announcement event e:

i. Load the data set obtained from *Step 6.2*.

ii. Derive *event date index* as the number of trading days between *trading date* and *announcement dates* of e.

iii. Keep records with *event date index* $\in [-60, 60]$.

iv. Derive mean ARs by *event date index* and *SUE deciles*. Collapse the data set into a decile-event-date panel.

v. For each portfolio (i.e., SUE decile), derive cumulative abnormal returns (CARs) at each trading day within the event window. The cumulative abnormal return for portfolio p from t_0 (i.e., the first day in the event window) to t_n is given by

$$CAR_{p,t_n} = \sum_{j=0}^{n} AR_{p,t_j},$$

vi. Keep *event date index, SUE decile, CAR* columns, and save the resulting data set as an independent data file or a dataframe.

Step 6.4 Aggregate all decile-even-date panles obtained from *Step 6.3*. For each *SUE decile* and *event date index*, derive mean CARs over all events.

Step 6.5 Plot resulting *CARs* with respect to *event date index* by *SUE deciles*. Ideally, you find something similar with Figure 1.

Hints

1. The empirical design introduced above is a simplified version used by Foster, Olsen, and Shevlin (1984) and Bernard and Thomas (1989). You may find it helpful to quickly scan the two papers before getting hands dirty.

2. The *ending date of statistics* identifies 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 *ending date of statistics* 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. We can use *ending date of statistics* to identify a earnings announcement event.

3. The *announcement date* stands for the real date when the statement is actually released by companies. 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]. For a same earnings announcement, different companies usually have different *announcement dates*.

4. In an event study, trading records can be re-indexed by calculating the number of trading days between *trading dates* and *event dates* (i.e., *announcement dates* in our setting). The new index is called *event date index*. For example, assume a statement is released at 2021/8/31, then the *event date index* for trading at 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.

5. You may find bysort and asrol in Stata helpful for Step 3.10.

Expected outcomes

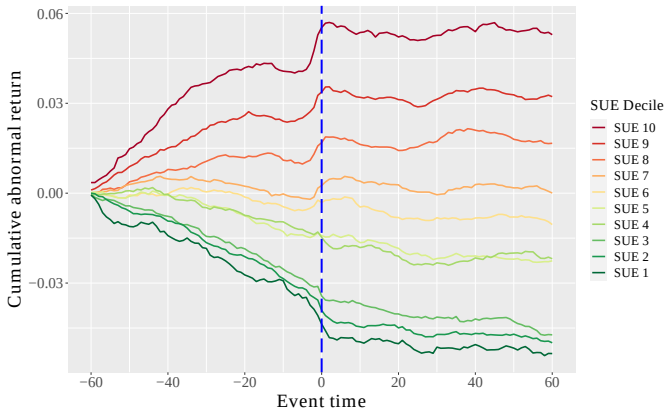

Figure 1: Cumulative abnormal returns by SUE deciles

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.

Foster, George, Chris Olsen, and Terry Shevlin (1984). “Earnings releases, anomalies, and the behavior of security returns”. In: *Accounting Review*, pp. 574–603.