

Financial Econometrics

Final Project :

**Event Study – Post loss/profit
announcement**

113352033 柯明志

113352025 黃彥博

113352030 胡益鳴

Abstract

We examine post-announcement drift in the Taiwan stock market using data from Q1 2018 to Q3 2024. We calculated cumulative abnormal returns under size-adjusted and Fama-French multi-factor models to compare with findings from *Post Loss/Profit Announcement Drift*. Results reveal that while the size-adjusted model shows increasing returns up to decile 7 and volatility in deciles 8–10, the multi-factor models exhibit a consistent decline in returns as deciles increase. These differences highlight the unique characteristics of the Taiwanese market and emphasize the importance of model selection in analyzing market inefficiencies and investor behavior.

Instruction

The paper, 'Post loss/profit announcement drift', investigates the market's reaction to quarterly loss/profit announcements. The authors document a phenomenon known as '*Post Loss/Profit Announcement Drift*', in which the market fails to incorporate earnings information on time fully. Analyzing data from 1976 to 2005, the study finds that, over the 120 trading days following the announcements, extreme loss portfolios exhibit significantly negative returns, while extreme profit portfolios show positive returns. This anomaly surpasses previously documented earnings-based anomalies, such as post-earnings-announcement drift (PEAD) and book-to-market effects. The mispricing is attributed to investors' failure to effectively consider conditional probabilities, particularly in less informed market conditions.

Based on the above findings, we aim to investigate whether similar phenomena occur in the Taiwan stock market. Specifically, we intend to explore the market's reaction to quarterly loss/profit announcements in Taiwan and determine whether the results align with those presented in the paper, where extreme loss portfolios exhibit significantly negative returns, and extreme profit portfolios show significantly positive returns. Using data from Taiwan-listed companies for the period from 2018 Q1 to 2024 Q3, we will calculate abnormal returns using both size-adjusted returns and the Fama-French three-factor

model to analyze the market's response to quarterly earnings announcements.

Data

In this project, all data were from the Taiwan Economic Journal(TEJ) database. The data for this project includes all listed companies on the Taiwan stock market. We have collected daily closing prices, quarterly total assets, quarterly retained earnings, and data for the Fama-French four-factor model. The data covers the period from January 1, 2018 (Q1 2018), to September 30, 2024 (Q3 2024).

Method

Each quarter, we rank all companies based on the ratio of retained earnings to total assets and partition all firm-quarter observations into ten earnings deciles. This approach is designed to eliminate the influence size effects on retained earnings, allowing us to objectively observe the Taiwan stock market's reaction to quarterly loss/profit announcements after controlling for size effects.

We measure buy-and-hold abnormal returns, for firm i over n trading days, as follows:

$$\prod_{t=1,n}(1 + R_{it}) - \prod_{t=1,n}(1 + ER_{it}) \quad (1)$$

where R_{it} is the daily return for firm i on day t , inclusive of dividends and other distributions, and ER_{it} is the expected return on day t for that firm.

We use two alternative measures to estimate expected returns. The first measure is based on firm size (market capitalization) and the second measure is based on Carhart's (1997) four factor model. Our first measure of daily expected return for firm i on day t , the one based on firm size, is defined as the value-weighted return for all firms in firm i 's size matched decile on day t , where size is measured using market capitalization at the beginning of the most recent calendar year.

we also compute daily expected returns based on Carhart's (1997) four factor model. We first estimate the following model using pervious quarter data:

$$R_{it} - RF_t = a_i + b_i(RMRF_t) + s_i(SMB_t) + h_i(HML_t) + p_i(UMD_t) + e_i \quad (2)$$

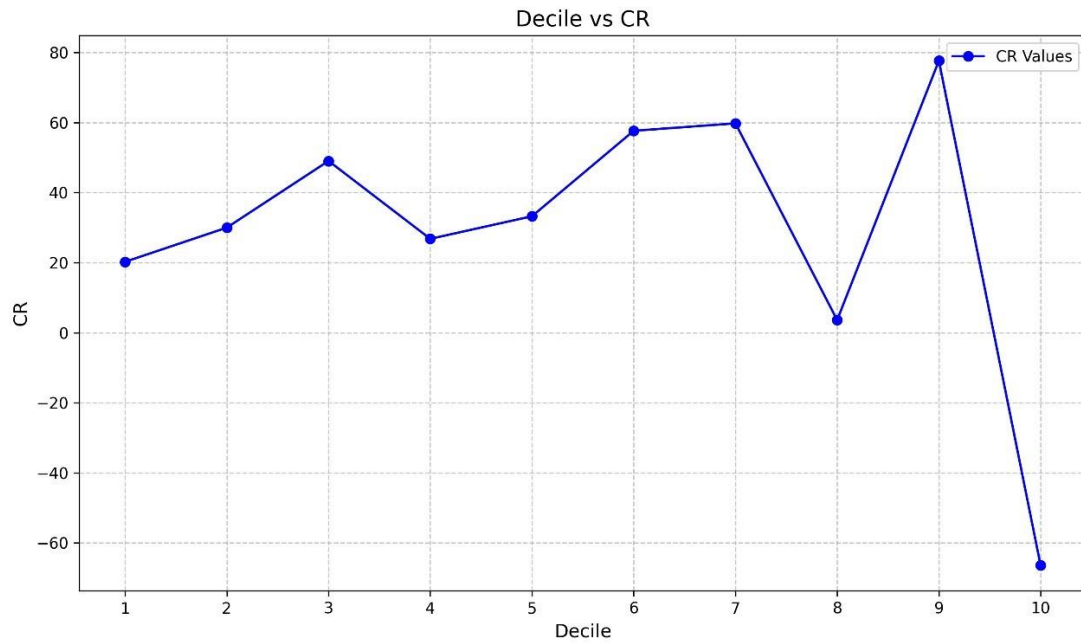
where R_{it} is defined as before, RF_t is the one-month T-bill daily return, $RMRF_t$ is the daily excess return on a value-weighted aggregate equity market proxy, SMB_t is the return on a zero-investment factor mimicking portfolio for size, HML_t is the return on a zero-investment factor mimicking portfolio for book-to-market value of equity; and UMD_t is the return on a zero-investment factor mimicking portfolio for momentum factor.

We then use the estimated slope coefficients from Eq. (2), b_i , s_i , h_i , and p_i , to compute the expected return for firm i on day t as follows:

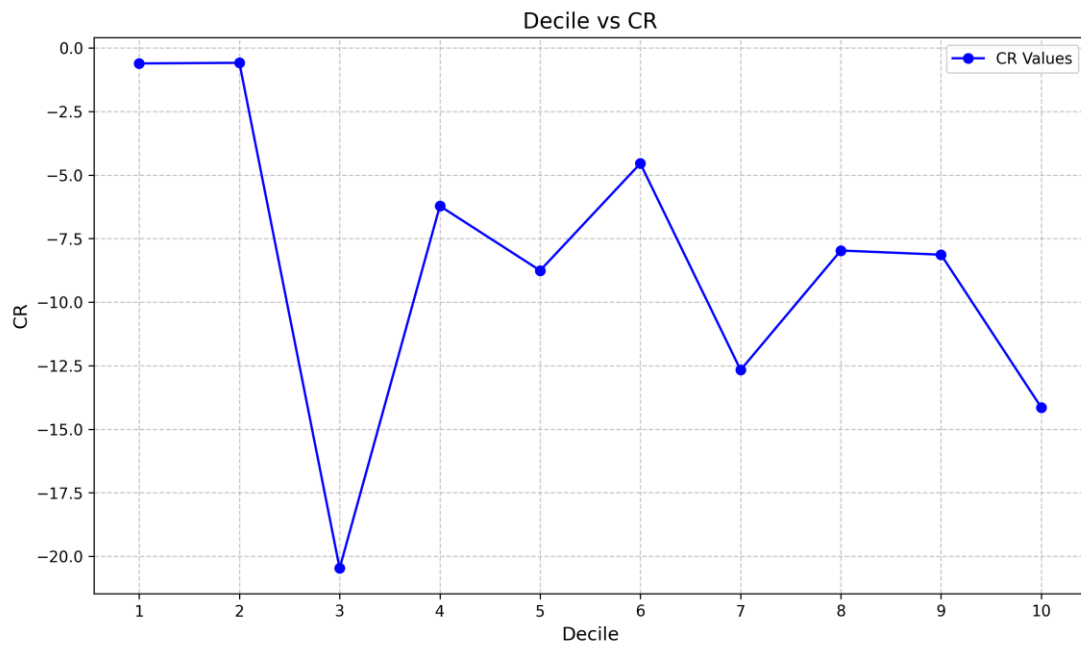
$$ER_{it} = RF_t + b_i(RMRF_t) + s_i(SMB_t) + h_i(HML_t) + p_i(UMD_t) \quad (3)$$

We also calculated cumulative abnormal returns based on the Fama-French one-factor, two-factor, and three-factor models to compare whether each decile exhibits significant differences as additional factors are introduced. Consistent with the findings in '*Post Loss/Profit Announcement Drift*', we aim to determine whether extreme loss portfolios exhibit significantly negative returns and extreme profit portfolios show significantly positive returns.

Result



(Fig.1)



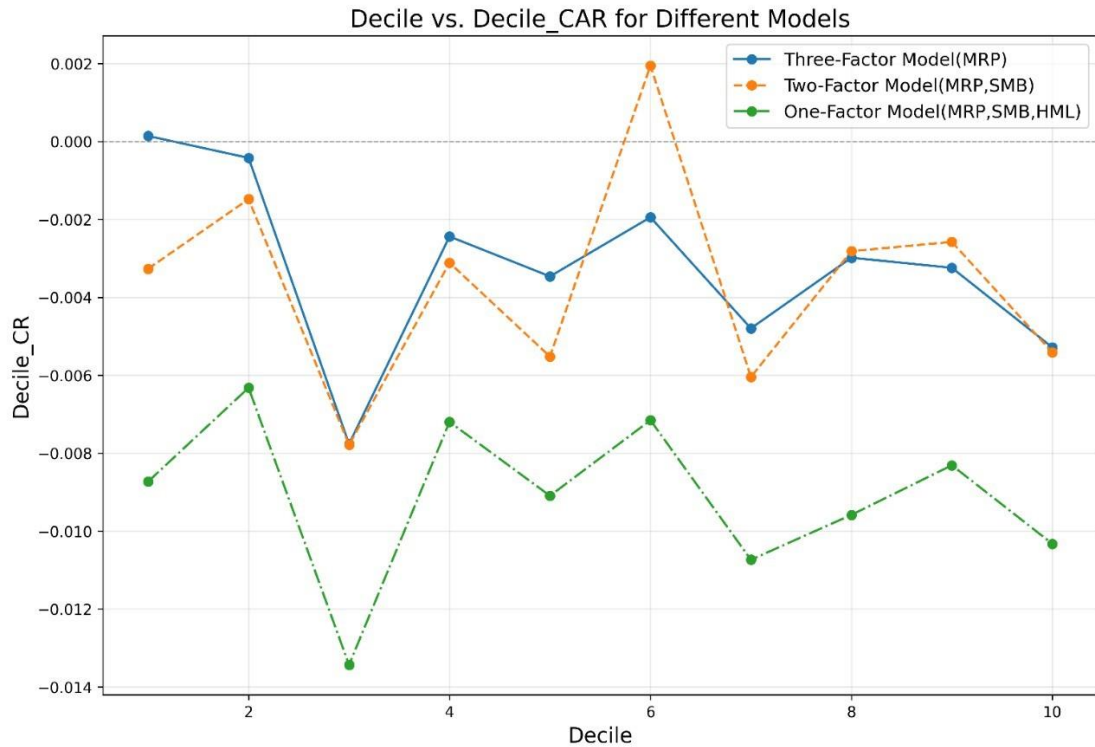
(Fig.2)

Fig 1 and Fig 2 represent the cumulative abnormal returns calculated using the size-adjusted return model and the Fama-French four-factor model, respectively. In Fig 1, the trend from decile 1 to decile 7 shows a gradual increase

in cumulative abnormal returns as the decile increases, indicating that portfolios with higher earnings tend to perform better. However, from decile 8 to decile 10, there is significant volatility, with decile 10 exhibiting extreme negative returns. In contrast, Fig 2 displays a completely different pattern, where cumulative abnormal returns gradually decrease as the decile increases. This downward trend is in stark contrast to the upward trajectory observed in Fig 1, highlighting the differing results produced by a multi-factor model.

Compared to the findings in *Post Loss/Profit Announcement Drift*, the results in Fig 1 and Fig 2 show notable differences. In the original study, extreme loss portfolios (decile 1) exhibited significantly negative returns, while extreme profit portfolios (decile 10) consistently delivered significantly positive returns. However, in Fig 1, decile 10 shows extreme negative returns, deviating from the expected positive performance of extreme profit portfolios. This discrepancy may reflect unique characteristics of the Taiwanese market, such as differences in investor behavior or the efficiency of information dissemination. On the other hand, Fig 2's results contradict the findings of the original study entirely. The cumulative abnormal returns decrease steadily as the decile increases, suggesting that the Fama-French four-factor model captures additional risk factors or market-specific anomalies, leading to outcomes that diverge from the size-adjusted return model.

Overall, while the Taiwanese stock market exhibits some evidence of post-announcement drift in Fig 1, the dynamics change significantly when returns are analyzed using a multi-factor model. This divergence underscores the importance of model selection in analyzing abnormal returns and may point to unique inefficiencies or structural differences in the Taiwanese market compared to the U.S. market studied in the original paper. Further investigation could examine how firm size, book-to-market ratio, and momentum factors influence these observed patterns in Taiwan.



(Fig.3)

We also calculated the cumulative abnormal returns under the one-factor, two-factor, and three-factor models to further explore the robustness of the results. It was observed that after incorporating the market excess return factor in the one-factor model, the results began to resemble those of the four-factor model, showing a gradual decline in cumulative abnormal returns as the decile increases. This similarity suggests that the market factor plays a significant role in explaining the observed trend. When the size factor and the book-to-market ratio factor were added in the two-factor and three-factor models, respectively, the trend remained consistent with the four-factor model. This alignment indicates that these additional factors help capture critical market characteristics, reinforcing the observation that cumulative abnormal returns decrease as deciles increase.

These results collectively highlight that the declining trend observed in the four-factor model is primarily driven by the market excess return factor, size factor, and book-to-market ratio factor. However, the inclusion of the momentum factor in the four-factor model adds further granularity, capturing additional market-specific anomalies or behaviors that may influence returns.

Conclusion

The results show notable differences compared to the original study. While the size-adjusted return model indicated a gradual increase in returns from decile 1 to decile 7, extreme volatility emerged from decile 8 to decile 10, with decile 10 exhibiting extreme negative returns. This contrasts with the original findings, where extreme profit portfolios consistently delivered significantly positive returns. Using the Fama-French four-factor model, cumulative abnormal returns displayed a steady decline as deciles increased, further diverging from the size-adjusted results and the original study's outcomes.

Additional analysis using one-factor, two-factor, and three-factor models revealed that introducing the market excess return factor produced results resembling the four-factor model. Adding the size and book-to-market ratio factors reinforced this declining trend, highlighting the importance of these risk factors in explaining abnormal returns in Taiwan.

These findings suggest that the Taiwanese market exhibits unique characteristics, such as differences in investor behavior or information efficiency, compared to the U.S. market. The discrepancies emphasize the significance of model selection in event studies and the need for further investigation into how factors like firm size, book-to-market ratio, and momentum affect post-announcement drift in Taiwan.