

Trading Strategy based on Earning Momentum in China

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Abstract

Started from the post-earnings announcement drift (PEAD) anomaly, this paper explores the abnormal return in China's a-share market by constructing earnings momentum strategy and conducting empirical study to measure the effects. We preliminarily calculate the standardized unexpected earnings (SUE) as trading signal and divide sample stocks into 6 groups to form portfolios, considering the size of the listed firms and the transaction cost, gaining the alpha return of 6.6 percent. Moreover, we refine the strategy through utilizing the 10-day moving average as the indicator for trading time instead of setting fixed time for each week and changing the signal weighting, ultimately the alpha reaches 7.5 percent, suggesting our strategy is high competitive.

Keywords

PEAD; Earning Momentum; Trading Strategy.

1. Introduction

1.1. Literature Review

Bill and Brown (1968) studied PEAD phenomenon firstly. After that, A large number of literatures verified the existence of PEAD phenomenon. Fama (1998) pointed out that the existence of PEAD could be proved by a large number of researches and data tests over the years and reviewed the PEAD phenomenon. In the following years, Scholars have shifted their focus to the causes of PEAD. Bernard & Thomas (1989) pointed out that the potential causes of PEAD phenomenon may be the market's misjudgment of system risk and CAPM model. In 1990, they explained why PEAD exists in a new perspective. The cause of PEAD phenomenon would be that investors are not fully aware of the impact this quarter's earnings will have on future earnings. Based on investors' perspective, individual investors are more sensitive to bad news than good news.

The capital market of China is quite different from the mature capital market, and domestic scholars have conducted a series of studies on PEAD based on domestic data. Current literatures in China also have proved the existence of PEAD phenomenon and explored the some causes of the phenomenon based on domestic data. Weihua Han et al.(2003) showed that PEAD phenomenon exists in China's capital market. Based on the Fama-French three-factor model, Jinyi Duan & Mancang Wang (2014) proved the existence of PEAD in China's A-share market. For the causes of PEAD, according to the current literature research, there are two main theories: (1) Imperfection of CAPM model; (2) Lagging price reflection, Liu (2003) promoted.

Some research also analyzes the imagination of the existence of PEAD from the perspective of investors. Lisheng Yu (2011) found that the drift of fund heavy holdings of stocks after the earnings announcement was less than that of non-fund heavy holdings for good news, but for

the bad news, the drift of fund heavy holdings of stocks was greater than that of non-fund heavy holdings. Jinyi Duan & Mancang Wang (2014) found that the group with high unexpected earnings is more liquid than the group with low expected earnings and is more sensitive to earnings information. In general, the existing research has proved the existence of PEAD phenomenon and analyzed the reasons why it exists in China from different perspectives.

1.2. Contributions

Unlike previous each scholar's research, they are more biased toward the PEAD phenomenon itself, focusing on the macro performance of a-share market, and there is no in-depth analysis mining the practical significance of the various types of financial data in quarterly or annual reports. In terms of actual investment, previous studies did not take into account the transaction frequency, selection of time window and SUE the specific calculation and other aspects. Thus, in the a-share market research, there were some shortcomings. In this paper, we re-examine and study the data from 2008 to 2019, that is, the earnings per share of all normal stocks in the a-share market. The purpose is not to provide more evidence on the existence of PEAD, but to develop A trading strategy that can bring excess returns, namely A trading strategy based on PEAD effect.

In terms of the formulation of trading strategies based on the phenomenon of PEAD, we fully study and summarize the specific operation methods of the previous literature. Taking the earnings per share as the trading signal, we divide the normal a-share market stocks into different groups according to the size of SUE and assigned different investment proportions to them. The holding period of four weeks is neither too short of the announcement nor affected by next quarter's results. Trading frequency is set to once a week.

This paper mainly makes contributions in two aspects: On one hand, signal generation. In previous studies, the expected profit was often used to calculate SUE, but the expected profit was an uncertain data, whose size was usually related to different parameters set by the forecaster, and the size was often different from person to person. Therefore, the data had poor stability and could not reflect the phenomenon of PEAD well. Therefore, we choose earnings per share as signal, and considering the size of the listed company, earnings per share could more scientifically measure the size of SUE. On the other hand, the trading frequency. In the past strategy, they often chose the announcement of t+1 day as the trading opportunity. But considering we propose stock for the entire a-share market shares, normal and listed companies announced in the time relatively scattered, difficult to capture every stock signal at the same time, so we choose to observe the announcement of the release once or twice a week, and unified trading Monday, do both have solved the problem of signal dispersion, also won't reduce strategic income because of the transaction frequency is too low.

2. Data Description and Methodology

2.1. Data

Universe: China Equity Market of Shanghai Stock Exchange and Shenzhen Stock Exchange

Due to the nature of capital seeking profits, both scholars and investors has been trying to find and prove the existence of excess returns. As the ongoing effort to obtain higher returns on low risk level keeping growing in popularity around the globe. "Risk-Free Returns" through hedging strategies has become one of the most popular paths to success, not only in the western market but also emerging markets such as China.

During the last decades, two of the largest trading markets in China, the Shanghai and Shenzhen Stock Exchange, has been trying to set up an enormous regulations of accounting information disclosure, giving the market an opportunity to apply various strategies to achieve higher

returns. Earning Momentums being the one among popular strategies has been consistently showing many promising results, and particularly, Post-earnings-announcement drift.

2.1.1. Source

For this research all data are taken from WIND terminal. The whole sample includes 3796 firms in A-share market, including 13,3053 data of diluted EPS of 47 quarters as well as the date of quarterly earnings release, daily closing price of all A-share firms and HS300 index, overnight rate of SHIBOR. Diluted EPS data disclose of the company's quarterly operating level and profitability are used for the signal generation. The date of quarterly earnings release helps to decide the time of trading. In addition, the time series of daily closing price of all A-share firms and HS300 index indicate the performance of the companies in our sample, China stock market respectively. And the overnight rate of SHIBOR functions as risk-free return rate.

2.1.2. Data Range

The whole sample ranges from 2008 to 2019, 47 quarters for 12 years, which is a long period to provide clues about the existence of PEAD and the effectiveness of strategy even in different stages of the economic cycle.

Training data are from the first quarter of 2008 to the last quarter of 2015, among that the EPS of the first year is only for forecasting EPS and it is the first quarter of 2009 that we start trading. Furthermore, we choose test data ranging from the first quarter of 2016 to the third quarter of 2019, which is the updated.

2.2. Strategy

2.2.1. Signal Generation

Before trading, we calculate the SUE (Standardized Unexpected Earnings) when companies release earnings announcement quarterly. The common way to estimate SUE is the classical one put forward by Foster, Olsen and Shevlin (1984). Formula for this calculation is as follows:

$$SUE_{i,t} = \frac{A_{i,t} - E_{i,t}}{\sigma(A_{i,t} - E_{i,t})} \quad (1)$$

$A_{i,t}$: Actual EPS of the i th stock in quarter t

$E_{i,t}$: Expected EPS of the i th stock in quarter t (Time series, 4 quarters)

$\sigma(A_{i,t} - E_{i,t})$: Standard Deviation of the Expected EPS of the last four quarters

Positive results indicate that the earning is beyond expectation, showing additional benefit of the firm has not been exposed to the investors on the market, causing the stock price to not have included all the information. In this case, we choose to long the stock in order to gain surprising profit. On the other hand, when result turns to be negative, we short such firm on the stock market.

2.2.2. Portfolio Construction

Due to companies would release earnings report on different time before the deadline of information disclosure prescribed by the CSRC, we collect the quarterly report after the last trading day of every week, and trade them on the next trading day, making the trading frequency to be one week.

Since it takes longer for investors on the secondary market to absorb information from firms on the market, alongside with the time for stock prices to adjust according to investors' response, the holding period for this portfolio is set to be four weeks for every trading sample. If the holding period is to be set shorter, relevant information may not be sufficiently digested by the market and could potentially lead to loss in profitable opportunity.

Additionally, since the first three quarterly reports of one company are required to be released in April, July to August, and October respectively whereas the annual report is supposed to be released within January to April in the next accounting year, causing a couple of days overlapping. Considering this, the holding period is not expected to be longer, or the market may be impacted by the data of the next quarter.

As for sizing, sample stocks are divided into 6 groups according to the size of their quarterly SUE results. When dealing with companies that contains missing data, SUE is set to 0 instead of ignoring such companies. To obtain more stable investment returns, six groups (G1, G2, G3, G4, G5, G6) are signal weighted as 1/2, 1/3, 1/6, -1/6, -1/3, -1/2 respectively. And all the stocks in the same group are equally weighted.

In general, the formula is as follows:

$$\text{Portfolio} = 1/2 G1 + 1/3 G2 + 1/6 G3 - 1/6 G4 - 1/3 G5 - 1/2 G6 \quad (2)$$

2.2.3. Trade Execution

Fee cost of every equity asset on China market has been considered as 2‰ in total, including 1‰ stamp duty single-side levied plus brokerage, account management, transaction and transfer fee, which are double-side levied and adding up to 1‰.

In view of all the A-share stocks make their initial public offering at either Shanghai Stock Exchange or Shenzhen Stock Exchange, we chose both for the trading venues.

As for trading timing, we execute our strategy for qualified samples once a quarter. Longing or shorting the stocks the first day of the week that companies release their earnings reports, and also holding four weeks and ending up taking the opposite actions.

2.3. Research

2.3.1. Economic Intuition

PEAD is one of the emerging anomalies under the Efficiency Market Hypothesis. Scholars in the field of behavioral finance have proposed plenty of explanations for investors having only limited rationality, such as anchoring effect, conservatism and overconfidence. Under the background, it is hard for investors to timely react to the information exposure on the market, making it very time consuming for the market to digest information and adjust prices.

The uncertainty of the information influences the fluctuation of the price of equity and financial statements do not always accurately reflect the operating conditions of companies. Considering this, unexpected earnings, called good news, bring a wave of gains but bad news brings a wave of losses. Hence, PEAD strategy is extremely helpful to obtain excess returns.

2.3.2. Analysis

This paper calculated the following indicators to measure the rate of return. $R_{i,t}$ is the raw return for firm i on day t , and $P_{i,t}$ stands as the closing price of firm i on the day t . $R_{p,t}$ demonstrates the raw return for the portfolio on day t , and w_i represents the weight of firm i in the whole portfolio. $R_{m,t}$ serves as the raw return for the market, namely HS300 index on day t , and I_t shows the closing price of the index on the day t . CR_p expresses the cumulative return of the portfolio for the period T in one quarter. TCR_p has taken the fee costs into account. CR_m is the cumulative return of the market for the period T in one quarter. Excess return ER , which indicates the size of the return that the portfolio outperforms the market.

$$R_{i,t} = \ln\left(\frac{P_{i,t}}{P_{i,t-1}}\right) \quad (3)$$

$$R_{p,t} = \sum w_i R_{i,t}, \sum w_i = 1 \quad (4)$$

$$R_{m,t} = \ln\left(\frac{I_t}{I_{t-1}}\right) \quad (5)$$

$$CR_p = \sum R_{p,t}, t \in T \quad (6)$$

$$TCR_p = CR_p - 2\% \quad (7)$$

$$CR_m = \sum R_{m,t}, t \in T \quad (8)$$

$$ER = TCR_p - CR_m \quad (9)$$

Risk by the means of standard deviation:

$$\sigma_i = \frac{1}{d} \sqrt{\sum (R_{i,t} - \bar{R}_i)^2} \quad (10)$$

σ_i represents the daily standard deviation of firm i of the number of d days, and \bar{R}_i is the mean of $R_{i,t}$ over the time.

$$\sigma_p = \sqrt{\sum \sum w_i w_j \sigma_i \sigma_j \rho_{i,j}} \quad (11)$$

σ_p demonstrates the standard deviation of the portfolio, $\rho_{i,j}$ is the coefficient of association between firm i and firm j .

$$S_p = \frac{TCR_p - R_f}{\sigma_p} \quad (12)$$

Sharp ratio is S_p , and the R_f indicates the risk-free return, namely the overnight rate of SHIBOR in the same term.

$$\alpha = (R_{p,t} - R_f) - \beta(R_{m,t} - R_f) \quad (13)$$

CAPM model is used to offer clues for the alpha through regression and the robustness test.

$$P_{p,t} = \sum w_i P_{i,t}, \sum w_i = 1 \quad (14)$$

$$MDD = \max \frac{P_{p,t_1} - P_{p,t_2}}{P_{p,t_1}}, t_1, t_2 \in T, t_1 < t_2 \quad (15)$$

Maximum drawdown MDD, is served to measure the largest loss of one investor entering this portfolio at any time during the period T , namely the decline extent from one peak value to the lowest. $P_{p,t}$ shows the weighted price of the portfolio on day t .

3. Implementation

3.1. PnL Results

Figure 1 shows the SUE distribution diagram of all the normal stocks of a-share from 2008 to 19. Most of the data are concentrated in the range of (-25, 25) Whereas, outliers of this distribution are also present throughout several quarters, some even reaching 100 and -100.

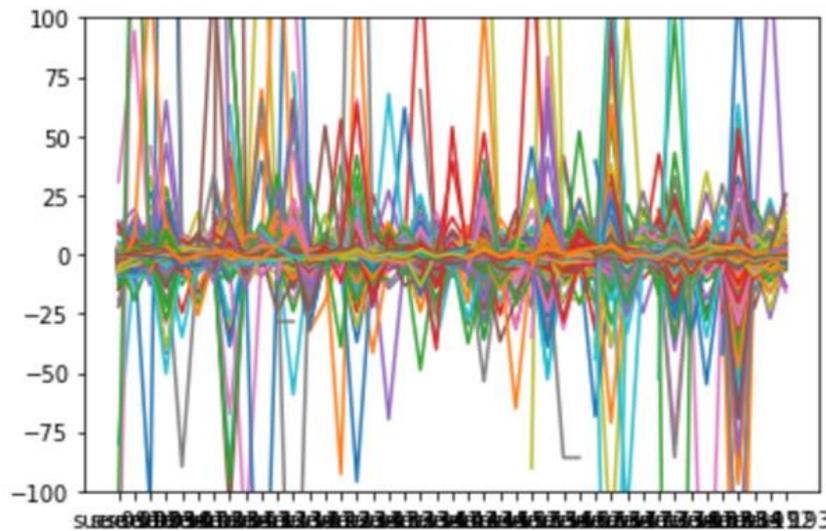


Figure 1. SUE Distribution

Figure 2 is the PnL diagram of the strategy return. The overall strategy return of the investment portfolio is in an upward trend. In a few years, there may be a decline, but the extent of the decline is small, and the duration of the decline is relatively short.



Figure 2. PnL Results

3.2. Evaluation for Returns

According to Table 1, the return rate of investment portfolio reaches more than 6%, far exceeding the risk-free interest rate of the market. The cumulative return rate of the portfolio constructed by PEAD strategy is much higher than the return rate of the market portfolio, that is, the excess return rate reaches an astonishing close to 8%, showing that using PEAD is more

efficient in long terms. The Sharpe Ratio of the strategy practice is 0.3375, which is also an acceptable figure for a strategy like PEAD that does not use leverage.

In CAPM model, β close to 1 indicates that the risk of PEAD investment strategy is close to the market level. The value of α is more than 6%, which is much higher than 0, reflecting that the actual return rate of the strategy is large and higher than the predicted return rate of the model. In other words, the portfolio is undervalued by the market and should be bought in time, which shows the necessity of implementing the PEAD strategy.

Table 1. Summary Statistics

Rp, t	0.0654
CRp	0.0986
TCRp	0.0966
CRm, t	0.0175
ER	0.0791
Rf mean	0.0238
Rm, t-Rf	-0.0235
sigmaR	0.2157
Sharpe Ratio	0.3375
Beta	1.1300
Alpha	0.0662

When comparing with our expectation, the expected risk of the strategy is less than that of the market portfolio, but the volatility of the portfolio constructed by the strategy is higher, which is likely to be caused by the nature of PEAD strategy's return.

Volatility is also the key to future refinement. The return rate, sharp ratio and other income data are basically in the expectation, but there is still a large room for improvement after refinement.

4. Refinement

4.1. Implementations

4.1.1. Moving Average Strategy

After analyzing large losses of stock cases, we found that most of the yield in the second day after the announcement would start to fall. So, if we can spot these stocks in advance, we would avoid bigger losses. The saved money could then go into new investment opportunities and improve capital efficiency. Using technical indicators to observe the market can not only verify the judgment of the strategy but also monitor the change of market sentiment. Moving average system is a simple and practical indicator effectively reflecting the strength of the current market. If the choice of time is too long, then the possibility of indicators passivation is greater, therefore won't achieve the purpose of eliminating the stocks. However, if the selection time is too short, and the index is too sensitive, the stock price will be sold after a slight fluctuation, losing the potential following gains. Since the relative returns and winning percentage of the strategy basically reach the maximum on the 20th trading day after the announcements, it is a relatively moderate strategy to sell below the 10-day daily average for 3 consecutive trading days intuitively.

4.1.2. Signal Weighting

In preliminary operations, according to the a-share market listed companies SUE distribution, most are concentrated near the $SUE = 0$, and at the time of the transaction we have SUE data within $(0.5, 0.5)$, but it won't fully reflect the majority of stock returns in the A stock market. Therefore, in addition to ignore $SUE = 0$ meaningless data, we select all shares including shares in the trading pool. Besides, the specific groups are expanded to 10, and the distribution interval of SUE was further refined, to achieve higher income through more accurate combination weight.

4.2. Results

4.2.1. PnL Graph



Figure 3. PnL Results

Refinement 1 (moving average strategy) & Refinement 2 (signal weighting)

Table 2. Summary Statistics

$R_{p, t}$	0.0821
CRp	0.0922
TCRp	0.0902
CRm, t	0.0175
ER	0.0727
Rf mean	0.0238
$R_{m, t} - R_f$	-0.0235
sigmaR	0.1820
Sharpe Ratio	0.3648
Beta	1.1050
Alpha	0.0749

From Table 2, the statistics are more fitting after combining refinement 1 and 2 together. The return rate of investment portfolio reaches more than 7%, far exceeding the risk-free interest rate of the market. The sharp ratio of the strategy practice is 0.3648, which is also better than 0.3375 before refinement. According to the refinement, β becomes smaller, indicating a lower

risk. The value of α is more than 7%, which is much higher than 0, reflecting that the actual return rate of the strategy is large and higher than the predicted return rate of the model. In other words, the portfolio is undervalued by the market and should be bought in time, which shows the necessity of implementing the PEAD strategy.

Refinement 3 (factor of industrial)

Table 3. Summary Statistics

portfolio	Excess Returns	CAPM Model α
1	0.0189 (1.16)	0.0088 (0.53)
2	0.0276 (1.82)	0.0158 (1.04)
3	0.0278** (2.00)	0.0160 (1.16)
4	0.0349** (2.42)	0.0233 (1.63)
5	0.0367** (2.52)	0.0242** (2.18)
5-1	0.0178*** (3.20)	0.0154*** (2.67)

We selected the five groups of data with the lowest returns and compared them by industry and SUE size, the excess returns and values of the sum of the portfolio were both smaller, indicating that the industry had a smaller response to the influence of PEAD. This is what we expected. However, it is hard to implement and thus there is no result available for this refinement.

4.3. Proposals

4.3.1. Add up Factors of Risk Anticipations

Expected risk refers to the uncertainty of investors' expectations. When financial data comes out, investors will adjust their expectations for the future under the influence of their expected risks. The greater the expected risk, the greater the adjustment range and the longer the adjustment time, the more drastic the stock price will drift. The share price is determined by the market's expectation of the future, so the riskier the stock is, the greater the profit after the transaction. When selecting stocks, we consider adding two factors, the number of sell-side analysts covered and the time of listing, to measure the risk expectation. Narrowing the pool of stocks and build a more precise portfolio in the hope of higher returns by choosing stocks with less coverage by sell-side analysts and less time to market.

4.3.2. Weighting Change

Considering transaction costs, capital turnover and other issues, it is necessary to set a time-related investment ratio. Since the beginning of one year, the investment fund will be divided into 50 shares equally, and positions initially be opened on each stock of the first 50 stocks meeting with the condition will be 1/50 of the total fund. This number is used because number of stocks satisfying the condition is usually around fifty in the first quarter of each year. For the second and third quarter, the fund will be divided into 100 shares, meaning positions opened on each one of the first 100 stocks will be 1/100 of the total fund. For the fourth quarter, the fund will be divided into 150 shares instead. These numbers (50/100/150) are selected

according to the number of preliminary announcements in each quarter and ensure the most efficiency of fund usage.

This position control aims to reduce transaction cost of frequently changing stocks in the portfolio and helps to control risk. Yet there is a trade-off between this trading cost and potential benefit of adopting higher position when forming initial portfolio.

4.3.3. Futures Hedging

PEAD strategy comes with extreme returns, whereas futures trading comes with a good function of hedging and hedging risks. So if combining PEAD trading strategies with futures, when to buying or selling stocks, according to its size of systemic risk of β , calculate the corresponding hedge ratio, selling or buying the corresponding stock futures to hedge the systemic risk, and at the same time the portfolio income volatility is reduced, the income of strategy is more stable and predictable.

5. Conclusion

5.1. Final Selection

By taking advantage of the lag of investors' reaction after the earnings announcement and the timeliness of information disclosure, we calculate the SUE of the normal class of stocks in the a-share market, eliminate the data of SUE=0, and divide the stocks into ten groups according to the different distribution of SUE. In order not to be affected by before and after quarterly reports, the holding period is four weeks. During the holding period, according to the ten-day moving average strategy, the holding period is set as a dynamic form to reduce the instability of portfolio returns. And according to the corresponding proportion to long (short) SUE>0(<0) grouping; And set up corresponding groups according to industry classification to observe the response degree of the industry to the influence of PEAD; The frequency of trading is observed on a weekly basis and traded on Mondays of each week to avoid the negative impact of low trading frequency on earnings. Combine the above strategies to trade finally.

5.2. Out of Sample Test



Figure 4.

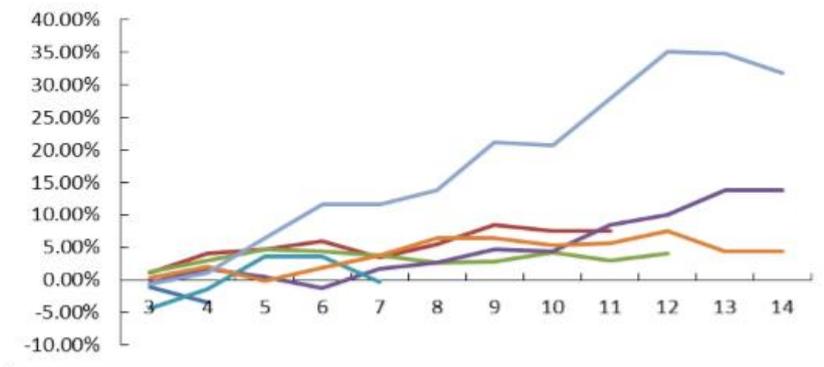


Figure 5.

For out of sample tests, we selected stocks from the previous experiments in 2014 that were not used and divided them into 7 groups according to SUE to conduct the out of sample test.

We can tell from the graphs above, the selected seven groups of stocks all achieved positive returns, whereas the other group all concentrated at around 5%. From historical test, we can say that the average cumulative rate of return for these strategies does not stabilize until 20 trading days after the initial report, so the returns should rise over time in the future. We've also calculated the average cumulative return of in chronological order from the moment the first stock that meets the strategy condition appears. Since the current 7 groups of stocks are all relatively small caps and main board stocks, we used the same period return of ZZ500 as the reference benchmark and found that the strategy could consistently outperform ZZ500

5.3. Additional Considerations

5.3.1. Other Investment Concerns

Return: (Factors of influencing the size of earnings)

Risk expectations for the stocks: The greater the risk expectations, the larger the adjustment and the longer the adjustment takes, so the greater the drift of the stock price. The risk expectations influence the effect of strategy execution.

Investor structure of the capital market: if there are more institutional investors in the market, PEAD phenomenon is weak; if there are more scattered investors in the market, stock price drift is large.

According to the research in recent years, for the earnings announcement with positive unanticipated earnings, the stock price of institutional investors drifts less than that of retail investors, but the unanticipated earnings is negative, and there is little difference between the two.

Risk:

liquidity risk: When we adopt a dynamic holding period, such as portfolios adjust according to the moving average, we trade more frequently, so the liquidity risk of stocks is the key consideration. The holding period expires or ends in advance. Whether the stock can be realized at the market price in time is an important factor to affect the stock earnings. If the stocks are less liquid, they are likely to be forced to sell at a discount or extend its holding period when trading, which leads to the risk that the strategy gains will narrow. Therefore, the tradeoff between the liquidity and the size of SUE in stocks selection is a difficult problem.

Information quality risk: the information quality of stocks will affect undesired earnings and excess returns, and the average abnormal returns of portfolios with low information quality will decline more than portfolios with good information quality. Therefore it may cause the risk of investment strategy return decline.

Operations:

PEAD strategy is one of the core for the direction of the earnings announcement right judgment and correct judgment for the size of the SUE, but if the announcement did not follow up in time, or other factors interfere with the market price formation mechanism, can lead to not when operating, income decreases, and even strategy fails, thereby causing loss to the larger, thus forming operation risk.

5.3.2. Business Concerns

Operations:

Future market: Due to the extreme nature of PEAD returns, we choose futures to hedge risks and reduce the instability of returns. However, for some countries with underdeveloped financial markets, futures markets are immature and imperfect, so it is likely that when constructing investment portfolios, it is impossible to find an effective corresponding futures product, thus affecting the implementation of trading strategies.

Future:

Decay: In a short time window, whether SUE is positive or negative, CAR will drift upwards and then gradually fall back. The possible explanation is that investors' incomplete response to the annual report results in a kind of "reaction lag" phenomenon. We named this period of "reaction lag" as "lost zone". In the above research, both the general trend chart of PEAD and the impact picture of industry factors on PEAD show that CAR abnormal drifting phenomenon of different degrees appeared within 20-30 days after the annual report announcement, that is, it first went up for a period of time and then returned to near the zero line. We call this phenomenon the lost zone.

Environment:

Degree of maturity of capital market: embodied in price discovery mechanism. If the market is more mature, the information disclosure mechanism will be more sound, the speed of information transmission will be faster, and the whole market will react and adjust to the earnings announcement faster, with less lag effect, finally the PEAD phenomenon will be weaker.

5.4. Trading Recommendation

Recently, with global stock markets underperforming, the expected risk for each investor in the future is very high, and when the announcement is made, the adjustment to their portfolio will be larger than normal. And now, as the annual report is published, it is the golden age of trading. In general, the core of the PEAD strategy is to correctly judge and identify the direction and size of the unexpected earnings, so there is no need to conduct any survey other than the one in our strategy.

References

- [1] Cui, Jing. "Marketization Process, Audit Quality and Earnings Announcement Effect." *Journal of Hubei University*, Vol.34, no.2, 2014, pp.087-088.
- [2] Duan Jinyi, Wang Mancang. "Study on The Drift Phenomenon after Earnings Announcement of China's A-share Market." *Northwestern university*,2014.
- [3] Jeffrey T.Doyle & Matthew J. Magilke, 2008, *The Timing of Earnings Announcements: An Examination of the Strategic Disclosure Hypothesis*, *The Accounting Review*.
- [4] Han Weihua, Yuan Ke, Wang Yanan, Chen Zhengrong. "An Empirical Study on the Phenomenon of PEAD in Chinese Stock Market" *Shenzhen Stock Exchange*,2003.

- [5] Pronk, M. 2005. The Impact of Intraday Timing of Earnings Announcements on the Bid-Ask Spread and Depth. *Journal of Accounting Auditing and Finance*.
- [6] Kross, W., and D. A. Schroeder. 1984. An Empirical Investigation of the Effect of Quarterly Earnings Announcement Timing on Stock Returns. *Journal of Accounting Research*.
- [7] Liu Dan, "Study on the Phenomenon of Drift PEAD after Earnings Announcement." *Shang Qing*, Vol29,2003.
- [8] Lihong Liang, 2003, "Post- earnings Announcement Drift and Market Participants' Information Processing Biases", *Review of Accounting Studies*, 8, pp.321~345.
- [9] Investor characteristics and the drift phenomenon after earnings announcement [J]. Yu li sheng. *Securities market leader*. 2006 (12).
- [10] Information uncertainty and the drift phenomenon after earnings announcement (PEAD) -- empirical evidence from China's listed companies [J]. Yu li sheng, wang yanyan. *Management world*. 2006 (03).
- [11] Limited arbitrage and price drift after earnings announcement [J]. Kong dongmin. *China management science*. 2008 (06).
- [12] Systematic pricing bias: A study on price drift after China's a-share earnings announcement [J]. Lu ting. *Financial research*. 2012 (03).
- [13] Xu. "Price jump in drift after earnings announcement." *Sohu*, 2020.
- [14] Yu, Lisheng. "A Review on The Phenomenon of Drift (PEAD) after Earning Announcement." *Accounting forum*, Vol.1, no.1, 2011, pp.35-39.
- [15] Yu Lisheng, "The Drift Phenomenon of Investor Characteristics and Earnings Announcement." *Shanghai University of Finance and Economics*,2004.