

The Market Reaction To Stock Splits Used as Dividends

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ABSTRACT

This paper investigates the market reaction to stock splits based on China's A share companies between 2007 to 2010. I find significant positive abnormal returns around the announcement date (especially before the announcement date) as well as four to six days before the execution date of China stock splits. I also observe significant negative abnormal returns just around the execution date. The above phenomenon is relatively stable even if the selection of samples and empirical models may vary, but the degree of this phenomenon might change overtime. The cross sectional regression of the abnormal returns for the announcement date shows that the phenomenon is sensitive to the split ratio and the market, and it is not sensitive to industry, company size and cash dividends. Therefore, combining with the empirical data I have constructed a high Sharpe ratio short selling investment strategy around the execution date. Then, the article further discusses the operability of the investment strategy and its stability over time.

Keywords: China's A share companies, Stock splits, Stock dividends, Announcement date, Execution date

1. Introduction

There is a common phenomenon about dividend policy of listed companies, that is, other than cash dividends, a proportion of the "stock sending" and "reserve transferring" do exist in China's securities market. Since cash dividends and stock dividends are coming from the accumulated undistributed profits of enterprises over the years. Further, "stock sending" in China is equivalent to foreign stock dividends. And, in the strict sense, "reserve transferring" is not part of the profit allocation, but is similar to foreign stock splits, due to it comes from the additional paid-in capital and surplus reserve of a firm. Yet, as the tradition among Chinese investors and scholars, I regard stock splits as stock dividends in my following study.(XUE Zu-yun/LIU Wan-li, 2009.)

Western scholars have put forward several hypotheses on the motivation of stock dividends and stock splits behavior. Of those, the signaling hypothesis (Asquith/ Healy/ Palepu [1989]) and the liquidity hypothesis (Baker/ Powell [1993], Muscarella/ Vetsuypens [1996]) have gained the most attention. Additionally, some studies find that the reputation hypothesis, the attention hypothesis and the optimal trading range hypothesis also provide some explanation power.

With the deepening of American scholars' researches, scholars all over the world are beginning to study the events of their own stock. Including, Christian Wulff (2002) found significant positive abnormal returns around both the announcement and the execution day of

German stock splits, and he also observed an increase in return variance and in liquidity after the ex-day.

In China's theoretical circle, this kind of study mainly focused on two points: the market reaction and factors that affecting the behavior of stock splits. In the direction of market reaction research, although different scholars have varied choices of the announcement date, all of the studies have found a positive response around the announcement day(ZHANG Shui-quan, [1997]; CHEN Xiao, [1998]; WEI Gang, [1998]; CHEN Lang-nan, [2000]; YU Qiao, [2001]; KONG Xiao-wen, YU Xiao-kun, [2003]). On the aspect of influencing factors, YUAN Hong-qi (2001) found negative correlation between stock dividends and stock dimensions by analyzing the dividend scheme of China's listed companies between 1994 to 1997. YANG Shu-e, CHEN Guo-hui have obtained the similar results in 2000. ZHAO Chun-guang(2001) found a substitution relation between stock dividends and cash dividends by using the annual report data in 1999. In 2000, by studying the law of stock dividends from the perspective of ownership structure, WEI Gang found a positive correlation between stock dividends and the proportion of tradable shares. In 2003, after analyzing motives for stock dividends, price illusion hypothesis was first mentioned by HE Tao, which indicates the behavioral motive of stock splits from the perspective of investors. This hypothesis suggests that the declined stock price caused by stock splits disturbed the normal judgment of investors. Specifically, the rising stock price that caused by those misguided investors who thought they just found the cheap stock, just meets the

companies' needs of improving their market value. As a result, this hypothesis suggests that the foreign price theory(also called as the optimal trading range theory) and the signaling theory cannot explain the behavior of stock splits in China. In 2004, by examining the information content of dividends of listed firms in China, ZHU Yun and WU Wen-feng who believe that there is a lack of consideration of the relationship between dividend changes and future profits in the current test of China's dividend signaling model, concluded that dividends do not contain the information of future earnings, since company managers do not formulate dividend policy according to the expectations of future earnings, and investors cannot obtain valuable information from the dividend policy. Consequently, the signaling hypothesis does not hold. LIU Wan-li and XUE Zu-yun(2010) firstly made an empirically research on the influence of stock price change after stock splits of China's listed companies on shareholders' wealth between 2008 to 2009 based on the mean comparison and testing method. They found that the day before ex-day, stock prices decline monotonously faster in 2008, compared to the adjusted stock prices. Yet, stock prices rise in 2009, which are significantly higher than the price on the day before ex-day after 14th day. Stock prices within 20 days are higher than the year-end stock price. Their results suggest that compared to the decision-making on the year-end stock price, stock dividend policy does not reduce stock prices, in fact, it increases that companies' total market value and shareholders' wealth.

Generally speaking, most of the literature above tested China's stock splits phenomenon by using foreign early-formed theories and hypotheses. And we are still on the primary stage of correlation analysis of stock splits relevant factors at present, namely, we not only have yet tested the applicability of foreign assumption of behavior motives to China's market, but also we have not offered the assumption for the situation in China. Therefore, in order to explore, there is the birth of this article.

2. Data and Methodology

2.1. Data Selection and Processing

The event study time of this article is selected from 2007 and 2010. Since during this time interval the financial market of China and the world were experiencing fluctuation, this study and the follow-up establishment of investment strategy could be more meaningful.

I construct three data sets(spl_event/index/etdaily) to comprise a core data set(returns), and the sample collection interval is selected from January 1, 2006 to December 31, 2010. Considering the buffering effect of non-trading days on stock prices, I exclude the stock splits on these days. All of the data used in this paper are from the CCER financial database.

2.2. Data Set Processing

The spl_event data set is a bonus and dividend data set. Since the study sample is China's A share listed companies, I only choose the stock code starting with the beginning of 0 or 6 as example, because they represent A share listed companies in Shenzhen and Shanghai stock market.

The index data is a set of returns of market portfolio, therefore I select Shanghai and Shenzhen 300 index(980300) as returns of market portfolio in this article. The Etdaily data set is a daily yield data set. The CSRS¹ is the classification standard to distinguish different industry. The Tradstat(trading status) is to remove bad companies, such as ST², PT³. The Return(daily stock yield) has already been adjusted, so do not require further adjustment. The Mktcap⁴(total A share stock market value in circulation) is used to approximate the firm size in the following cross section regression.

2.3. Interval Selection and Statistic Interpretation

Considering there is usually only one or two months between the announcement and the execution date, in order to prevent the overlapping of data while calculating the CAR, I use the same estimation window to evaluate the value of α, β of each event. At last, the estimation window [-110,-11] is selected before the announcement day, the event window of announcement day is selected at the announcement date [-10,10], and the event window of execution day is selected at the execution date [-10,10].

Three test statistics are computed in this article in order to determine statistical significance. The first one is the

¹ China Securities Regulatory Commission(CSRC) developed the standard of industry classification in 1998. See "china listed corporation classification guidelines (Trial)", April 7, 1999. No. 5.

² ST refers to a special treatment for a listed company that has two consecutive years of losses. Namely, before the name of special treatment stock there will be a abbreviation ST given by the Shanghai and Shenzhen Exchange from the beginning of April 22, 1998.

³ PT refers to the suspension of the listing of a firm's stock and the implementation of special transfer services to a firm, which has three consecutive years of losses, given by the Shanghai and Shenzhen Stock Exchange according to the company law and the security law since July 9, 1999. Before the stock's name there will be a PT.

⁴ In this article, total A share stock market value in circulation=yesterday closing price×yesterday total number of shares in circulation.

simple t-test, which is under the assumption of same variance. The second one is the t-test(Brown/Warner[1985]), which is under the assumption of different variance denoted as T(BW) in this paper. The last one is the nonparametric Wilcoxon signed rank test, which is to reduce the interference caused by the extreme data. The p-value(Wt) is the p-value of the nonparametric Wilcoxon signed rank test.

3. Empirical Results

3.1. Using Market Return mod-

$el(R_{i,t} = \alpha_i + \beta_i R_{m,t} + \varepsilon_{i,t})^5$ and sample with no cash dividend to study the short-term market reaction.

CASE.1. Market reaction to the announcement in the event window [-10,10].(average daily abnormal returns, average cumulative abnormal returns and their significance)

Table 1 and 2 and Figure 1 present the abnormal returns and the cumulative abnormal returns around the announcement in case 1.

Eventdate is relative span to the announcement or the execution date. AR refers to the mean of the abnormal returns. negative AR % are the percentage data of negative abnormal returns. CAR refers to the mean of the cumulative abnormal returns. negative CAR % are the percentage data of negative cumulative abnormal returns. Significance levels: *** 1% level, ** 5% level, * 10% level. (the annotation above applies to all of the Tables)

Table 1: Abnormal Returns Around the Announcement in case 1

Event date:	AR :	negative AR %:	t(BW):	simple-t:	p-value (Wt):
-10	0.31%	51.01%	1.51	1.57	0.54
-9	0.26%	53.77%	1.25	1.25	0.73
-8	0.20%	52.00%	1	0.94	0.91
-7	0.02%	52.74%	0.09	0.08	0.60
-6	0.34%	49.50%	1.65	1.66*	0.52
-5	0.44%	46.80%	2.14	1.93*	0.39
-4	0.12%	50.98%	0.06	0.55	0.94
-3	0.19%	49.27%	0.92	0.87	0.63
-2	0.46%	43.20%	2.23**	2.21**	0.04**
-1	0.83%	43.00%	4.06***	3.18***	0.01**
0	0.69%	45.19%	3.37***	1.83*	0.17
1	0.09%	54.07%	0.45	0.34	0.28
2	0.16%	49.05%	0.79	0.77	0.84
3	-0.04%	58.29%	-0.12	-0.24	0.17

⁵ William F. Sharpe, "A Simplified Model of Portfolio Analysis", Management Science, January 1963.

4	-0.13%	53.30%	-0.65	-0.67	0.10
5	-0.29%	55.40%	-1.43	-1.61	0.03**
6	-0.35%	56.07%	-1.69*	-1.63	0.01***
7	-0.08%	48.84%	-0.4	-0.39	0.54
8	0.09%	45.83%	0.44	0.45	0.86
9	0.08%	48.39%	0.39	0.41	0.66
10	-0.18%	54.13%	-0.86	-0.8	0.10

Table 2: Cumulative Abnormal Returns Around the Announcement in case 1

Event date:	CAR :	negative CAR %:	t(BW):	simple-t:	p-value (Wt):
-10 to 0	0.69%	47.47%	3.37***	1.83*	0.17
-1 to 1	1.62%	46.97%	4.55***	2.64***	0.08*
-2 to 2	2.24%	41.92%	4.87***	3.22***	0.00***
-3 to 3	2.38%	38.38%	4.38***	3.15***	0.00***
-4 to 4	2.37%	40.91%	3.85***	2.86***	0.00***
-5 to 5	2.52%	41.41%	3.70***	2.93***	0.00***
-6 to 6	2.51%	42.93%	3.39***	2.70***	0.03**
-7 to 7	2.45%	45.96%	3.07***	2.49*	0.06*
-8 to 8	2.74%	43.43%	3.23***	2.59**	0.03**
-9 to 9	3.08%	41.92%	3.44***	2.79**	0.01***
-10 to 10	3.21%	43.94%	3.41***	2.73***	0.02**

Figure 1: Cumulative Abnormal Returns Around the Announcement in case 1

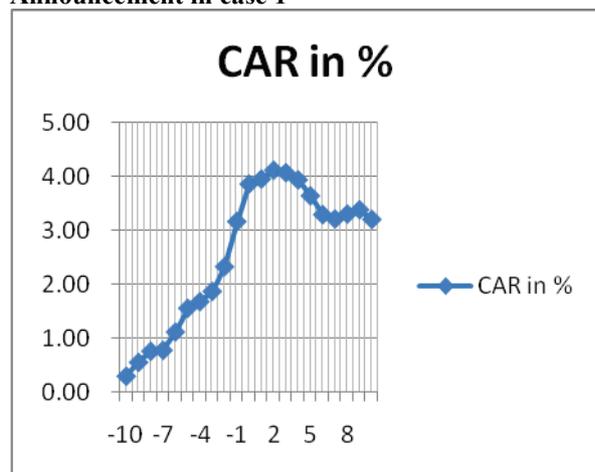


Table 1 shows significant positive abnormal returns before and on the announcement date. The results of both t(BW) and simple-t test indicate significance 2 days before and on the announcement date, but insignificance after the announcement date. Table 2 shows significant cumulative abnormal returns around the announcement. According to Table 1, I infer that the cumulative abnor-

mal returns are composed mostly by the abnormal returns before and on the announcement date. Figure 1 shows the cumulative abnormal returns starting 10 days before the announcement date, from which i can confirm the above conclusion further: significant positive abnormal returns before and on the announcement date, but not very significant after the announcement date since information has been fully absorbed after the announcement.

Several hypotheses have been put forward to explain the motivation behind stock splits in China's listed companies. Other than the signaling hypothesis and the liquidity hypothesis, the price illusion hypothesis(HE Tao/CHEN Xiao-yue [2003]) suggests that the final goal of stock splits is to enhance enterprise's market value with no cost. Because a company with high market value can not only manipulate the stock price, but can also offer additional equity , etc. It is hard to completely enumerate and difficult to verify. The important condition for listed companies to achieve this goal is that investors have price illusion to their stocks. Namely, first, investors have only limited abilities to assess the value of the stock, although they not only analyze the fundamentals of a firm, but they will also consider the relative price to the overall market and the company's history. Second, at least part of the new investors, who only judge the absolute stock value, like to buy low-priced stocks cause by stock splits. At last, listed companies use stock splits to enhance their market value. In short, stock splits finally enhance company's market value by disturb investors' judgment without changing the fundamentals of the company. That is why there will be positive cumulative abnormal returns. At the same time, the significant positive abnormal returns around the announcement shows that stock splits are welcomed by participants in the stock market.

It is worth noting here that abnormal returns mostly appear a few days before the announcement date. As usual, investors could not foresee the future. However, combined with China's securities market, i deduce that the investor's possession of information is asymmetric and uneven distribution. The message of stock splits may be revealed to insiders early, so their purchase before the announcement cause the abnormal returns, and the information would be digested almost completely on the announcement date. But several studies said, some investors' expectations agree with the plan of stock splits, or maybe some institutional investors have already known the plan before the announcement, that is why the abnormal returns fluctuate lightly around the announcement.

CASE.2. Market reaction to the execution in the event window [-10,10].(average daily abnormal returns, average cumulative abnormal returns and their significance) Table 3 and 4 and Figure 2 present the abnormal returns and the cumulative abnormal returns around the execution in case 2.

Table 3 shows, between 2007 to 2010, significant positive abnormal returns 4 to 6 days before the ex-day, and

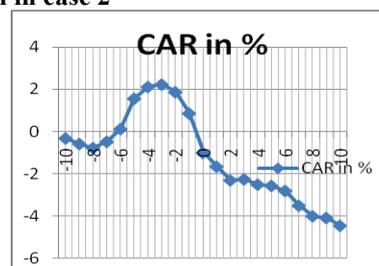
Table 3: Abnormal Returns Around the Execution in case 2

Event date:	AR :	negative AR %:	t(BW):	simple-t:	p-value(Wt):
-10	-0.18%	54.55%	-0.89	-0.77	0.28
-9	-0.30%	60.10%	-1.48	-1.32	0.01***
-8	-0.16%	57.07%	-0.78	-0.68	0.08*
-7	0.26%	45.46%	1.28	1.34	0.18
-6	0.58%	48.49%	2.83***	2.46**	0.06*
-5	1.33%	36.87%	6.46***	5.05***	0.00***
-4	0.71%	46.97%	3.45***	3.08***	0.02**
-3	0.19%	53.54%	0.94	0.83	0.81
-2	-0.51%	62.12%	-2.49**	-2.36**	0.00***
-1	-1.01%	52.02%	-4.90***	-1.93*	0.24
0	-1.90%	81.31%	-9.27***	-2.96***	0.00***
1	-0.77%	63.64%	-3.76***	-2.93***	0.00***
2	-0.64%	60.10%	-3.09***	-2.44**	0.00***
3	0.06%	52.02%	0.31	0.26	0.77
4	-0.07%	55.05%	-0.35	-0.28	0.18
5	-0.25%	60.10%	-1.23	-0.97	0.02**
6	-0.19%	59.60%	-0.92	-0.78	0.02**
7	-0.66%	62.63%	-3.22***	-2.86***	0.00***
8	-0.49%	67.17%	-2.40**	-2.06**	0.00***
9	-0.05%	55.05%	-0.24	-0.23	0.30
10	-0.49%	61.11%	-2.39**	-2.15**	0.00***

Table 4: Cumulative Abnormal Returns Around the Execution in case 2

Event date:	CAR :	negative CAR %:	t(BW):	simple-t:	p-value (Wt):
-0 to 0	-1.90%	81.31%	-9.27***	-2.96***	0.00***
-1 to 1	-3.68%	73.23%	-10.35***	-4.16***	0.00***
-2 to 2	-4.83%	69.19%	-10.51***	-4.97***	0.00***
-3 to 3	-4.57%	67.68%	-8.41***	-4.48***	0.00***
-4 to 4	-3.94%	65.66%	-6.38***	-3.76***	0.00***
-5 to 5	-2.86%	57.58%	-4.20***	-2.56**	0.00***
-6 to 6	-2.47%	57.07%	-3.33***	-2.11**	0.01***
-7 to 7	-2.86%	61.11%	-3.60***	-2.42**	0.01***
-8 to 8	-3.52%	61.62%	-4.15***	-2.93***	0.00***
-9 to 9	-3.87%	64.65%	-4.32***	-3.14***	0.00***
-10 to 10	-4.54%	67.17%	-4.82***	-3.53***	0.00***

Figure 2: Cumulative Abnormal Returns Around the Execution in case 2



significant negative abnormal returns 1to 2 days before and after the ex-day. Table 4 shows that 81.31% of

stocks has abnormal returns on the ex-day, and this phenomenon is significant indicated by simple-t and t(BW) test. Figure 2 shows the most obvious accumulative negative returns appear 2 days before and after the ex-day. Since all statistical tests indicate significant AR and CAR around the ex-day, the execution event does have the information content. Generally speaking, there would be a period of time between the announcement date to the ex-day, so the implied information effect could not last to the ex-day due to the market efficiency. Yet, abnormal price behavior has been found surrounding the ex-day according to the empirical studies of some foreign scholars. Such as, Eades, Hess and Kim(1984) find statistically significant non-zero positive abnormal returns from day -4 to +3(ex-day is 0), based on the study of 1550 ex-right events in New York Stock Exchange between 1962 to 1980. Woolridge (1983) find the abnormal returns 9 days before the ex-day differs by almost 4%. Since the empirical study shows that an abnormal return of 7.82% appears in the month and previous two months of the execution, LI Cun-xiu (1990) thinks that the ex-dividend event does convey a message, namely a company will tell its investors the change of its future cash flow by stock dividends. On the other hand, investors will also infer a company's information according to its published dividend rate. Therefore, the signaling effect of ex-dividend event could appear before or after the execution. But, the results of this paper show that in China the signaling effect appears before the ex-day, this may be due to the ex-dividend news has been disclosed early, so the market reacts early. I think the expectation psychology of Chinese investors can perfectly explain this phenomenon. Specifically, buying before the ex-day and the behavior of chasing the stock price lead to the significant positive abnormal returns before the ex-day. Then at the end of the information effect, stocks have been sold, and that is why negative abnormal returns appear after the execution. This process shows that most Chinese investors tend to short-term speculation, rather than long-term investment, and they barely consider the asymmetric information as well. Since the ex-dividend event is always a bullish factor, it has been in the lime-light for a long time in China's equity market. It is noteworthy that the significant negative abnormal returns appear before the ex-day, documented in relevant studies of other countries, can be explained by the tax burden effect proposed by Elton and Gruber (1970). This effect states that the higher the tax rate, the higher the abnormal return rate would be needed for investors to involve in the ex-dividend. If the tax rate exceeds the market average, since the abnormal returns will be insufficient to make up for the tax burden, those investors with high tax rate are willing to sell stock before the ex-day, which is the so-called abstention. In general, since investors with high tax rate who are holding more stocks are mostly the abstainers, the pressure of selling is greater than that of buying. Therefore negative abnormal returns appear be-

fore the execution. However, similar to the study of TIAN Jian-zhong(2007), which indicates that the tax effect is not significant in China, I find significant positive abnormal returns 4 to 6 days before the ex-day. As a result, the expectation psychology is applicable to reaction on the execution in China's securities market, since Chinese investors will actively participate in the ex-dividend, other than abstention.

3.2. Using market-adjusted return mod-

$$el(R_{i,t} = R_{m,t} + \varepsilon_{i,t})^6 \text{ and sample with no cash}$$

dividend to study the sensitivity of the results to the method.

CASE.3. Market reaction to the announcement in the event window [-10,10].(average daily abnormal returns, average cumulative abnormal returns and their significance)

Table 5 and 6 and Figure 3 present the abnormal returns and the cumulative abnormal returns around the announcement in case 3.

Table 5: Abnormal Returns Around the Announcement in case 3

Event date:	AR:	negative AR %:	Simple-t:	p-value (Wt):
-10	0.53%	45.45%	2.26***	0.08*
-9	0.50%	48.99%	2.54**	0.11
-8	0.40%	52.02%	1.86*	0.33
-7	0.27%	50.51%	1.20	0.59
-6	0.49%	49.49%	2.52**	0.13
-5	0.68%	45.45%	3.03***	0.03**
-4	0.40%	47.47%	1.81*	0.26
-3	0.39%	49.49%	1.79*	0.18
-2	0.62%	41.92%	2.97***	0.00***
-1	1.08%	41.41%	4.12***	0.00***
0	0.87%	43.94%	2.39**	0.05**
1	0.33%	53.54%	1.20	0.94
2	0.44%	50.00%	2.16**	0.11
3	0.16%	56.06%	0.88	0.86
4	0.08%	52.02%	0.42	0.61
5	-0.07%	52.02%	-0.38	0.59
6	-0.13%	55.56%	-0.63	0.10*
7	0.17%	45.96%	0.84	0.52
8	0.34%	47.98%	1.73*	0.21
9	0.29%	49.49%	1.45	0.57
10	0.05%	52.02%	0.23	0.58

Table 6: Cumulative Abnormal Returns Around the Announcement in case 3

⁶ Wugle, J. K. Zhuravskaya, "Does Arbitrage Flatten Demand Curves for Stocks", Journal of Business, 2002.

Event date:	CAR :	negative CAR %:	Simple-t:	p-value (Wt):
-10 to 0	0.87%	43.94%	2.39**	0.05**
-1 to 1	2.28%	42.42%	3.81***	0.00***
-2 to 2	3.35%	37.88%	4.92***	0.00***
-3 to 3	3.90%	33.84%	5.33***	0.00***
-4 to 4	4.38%	32.32%	5.51***	0.00***
-5 to 5	4.99%	33.33%	6.01***	0.00***
-6 to 6	5.35%	33.84%	6.09***	0.00***
-7 to 7	5.79%	31.82%	6.41***	0.00***
-8 to 8	6.54%	31.82%	6.84***	0.00***
-9 to 9	7.32%	24.75%	7.34***	0.00***
-10 to 10	7.90%	29.80%	7.45***	0.00***

Figure3: Cumulative Abnormal Returns Around the Announcement in case 3

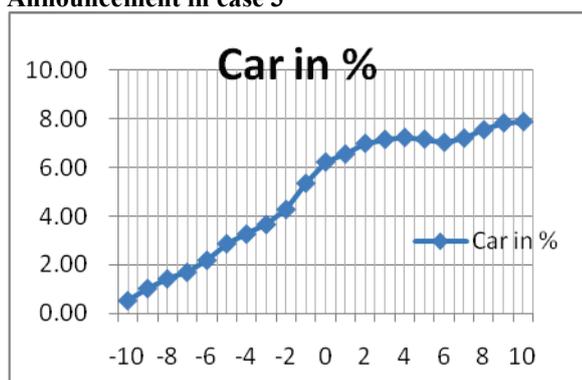


Table 5 and 6 and Figure 3 show more pronounced positive abnormal returns both in extent and significance around the announcement compared to the results in case 1. But at the same time, I find abnormal returns a little far before the announcement, which are not what I expected. Therefore, the market return model is more applicable to the study on the market reaction to stock splits around the announcement date.

CASE.4. Market reaction to the execution in the event window [-10,10].(average daily abnormal returns, average cumulative abnormal returns and their significance)

Table 7 and 8 and Figure 4 present the abnormal returns and the cumulative abnormal returns around the execution in case 4.

Table 7 and 8 and Figure 4 show significant negative abnormal returns around the ex-day, and significant positive abnormal returns 4 to 7 days before the execution date. We can see the overall conclusion does not change, but it is more pronounced both in extent and significance than the results in case 2. So, both models work well on this study.

3.3. Analysis on Sensitivity of the Results to the Sample Data

CASE.5. From the sample period standpoint, namely

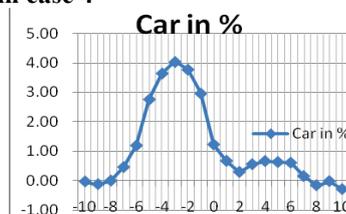
Table 7: Abnormal Returns Around the Execution in case 4

Event date:	AR :	negative AR %:	Simple-t:	p-value(Wt):
-10	-0.04%	48.99%	-0.15	0.73
-9	-0.09%	53.54%	-0.39	0.13
-8	0.12%	50.51%	0.51	0.76
-7	0.46%	43.94%	2.36**	0.02**
-6	0.74%	45.45%	3.13***	0.01**
-5	1.57%	34.34%	6.16***	0.00***
-4	0.88%	43.94%	3.83***	0.00***
-3	0.39%	50.51%	1.69	0.49
-2	-0.26%	60.61%	-1.22	0.03**
-1	-0.82%	50.51%	1.56*	0.89
0	-1.74%	77.27%	-2.69***	0.00***
1	-0.56%	62.12%	-2.19**	0.00***
2	-0.38%	54.55%	-1.48	0.02**
3	0.26%	51.01%	1.00	0.61
4	0.11%	56.06%	0.42	0.47
5	-0.03%	57.07%	-0.13	0.15
6	-0.02%	56.06%	-0.09	0.12
7	-0.46%	61.62%	-2.08**	0.00***
8	-0.31%	63.64%	-1.33	0.01***
9	0.14%	53.03%	0.67	0.77
10	-0.27%	61.11%	-1.20	0.03**

Table 8: Cumulative Abnormal Returns Around the Execution in case 4

Event date:	CAR :	negative CAR %:	Simple-t:	p-value(Wt):
-10 to 0	-1.74%	77.27%	-2.69***	0.00***
-1 to 1	-3.11%	71.21%	-3.50***	0.00***
-2 to 2	-3.75%	66.16%	-3.90***	0.00***
-3 to 3	-3.09%	60.61%	-3.11***	0.00***
-4 to 4	-2.10%	61.62%	-2.06**	0.01***
-5 to 5	-0.56%	53.03%	-0.52	0.46
-6 to 6	0.15%	50.51%	0.13	0.96
-7 to 7	0.15%	53.03%	0.14	0.94
-8 to 8	-0.04%	52.02%	-0.04	0.80
-9 to 9	0.01%	51.52%	0.01	0.53
-10 to 10	-0.30%	53.54%	-0.25	0.33

Figure 4: Cumulative Abnormal Returns Around the Execution in case 4



according to annual classification to study the abnormal returns around the announcement and the execution date by using the market return model and sample with no cash dividend.

Figure 5: Cumulative Abnormal Returns Around the Announcement in case 5 (classified in year)

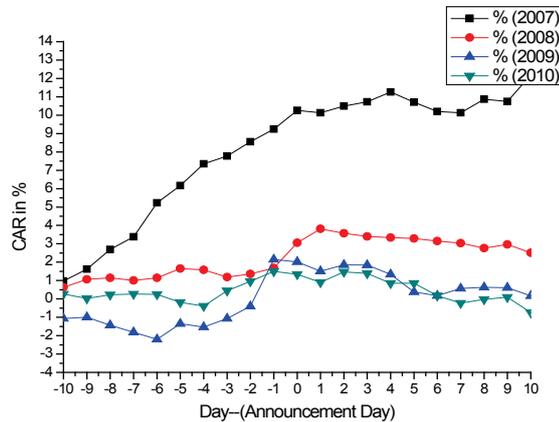
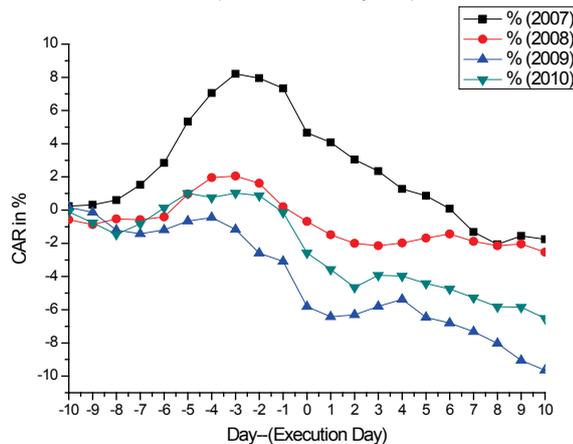


Figure 6: Cumulative Abnormal Returns Around the Execution in case 5 (classified in year)



From the comparison of Figure 1 and Figure 5, Figure 2 and Figure 6, we can find that the latter is actually the weighted average number of the former according to the annual event number. Specifically, Figure 5 shows positive abnormal returns 2 days before and after the announcement date in 2007 and 2008, but this phenomenon is almost unobvious in 2009 and 2010. Figure 6 shows obvious negative abnormal returns 2 days before and after the execution date no matter in which year. At the same time, it is obvious to see that the abnormal return 5 days before the ex-day mentioned in case 2 is mainly made up of data in 2007.

Through the discussion of case 5, I find different results in different years. This also reminds me the stability over time should be considered cautiously when building a trading strategy later.

CASE.6. Analysis on sensitivity of the abnormal returns around the announcement and the execution date to cash dividends by using the market return model.

CASE.6.1. Abnormal returns around the announcement date

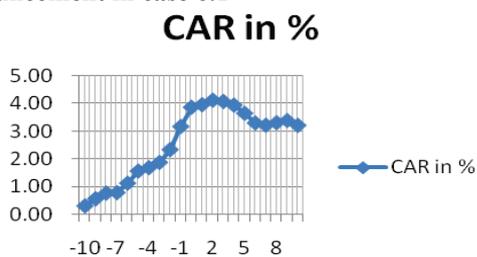
Table 9 and 10 and Figure 7 present the abnormal returns and the cumulative abnormal returns around the announcement in case 6.1.

Table 9: Abnormal Returns Around the Announcement in case.6.1.

Event date:	AR :	negative AR %:	t(BW):	simple-t:	p-value(W t):
-10	0.13%	54.44%	1.25	1.17	0.35
-9	0.10%	54.58%	0.97	0.95	0.36
-8	0.03%	54.16%	0.33	0.32	0.18
-7	0.10%	50.64%	1.01	1.02	0.81
-6	0.34%	48.94%	3.35***	3.15***	0.06*
-5	0.36%	49.22%	3.55***	3.11***	0.03**
-4	0.61%	45.70%	6.01***	5.19***	0.00***
-3	0.40%	47.11%	3.96***	3.30***	0.01***
-2	0.61%	45.13%	6.04***	4.90***	0.00***
-1	0.88%	43.87%	8.64***	6.46***	0.00***
0	0.15%	52.75%	1.52	0.98	0.72
1	-0.25%	58.96%	-2.48**	-2.08**	0.00***
2	-0.08%	56.14%	-0.83	-0.73	0.02**
3	-0.12%	56.14%	-1.14	-1.09	0.02**
4	-0.16%	56.84%	-1.54	-1.58	0.00***
5	-0.17%	55.43%	-1.65	-1.59	0.01***
6	-0.06%	55.99%	-0.60	-0.56	0.03**
7	0.04%	51.20%	0.42	0.40	0.51
8	-0.23%	55.99%	-2.23**	-2.28**	0.00***
9	-0.18%	55.15%	-1.81*	-1.76*	0.02**
10	-0.24%	57.26%	-2.33**	-2.23**	0.00***

Table 10: Cumulative Abnormal Returns Around the Announcement in case 6.1.

Event date:	CAR :	negative CAR %:	t(BW):	simple-t:	p-value(Wt):
-0 to 0	0.16%	52.83%	1.52	0.98	0.71
-1 to 1	0.78%	47.03%	4.44***	3.16***	0.02**
-2 to 2	1.31%	42.51%	5.78***	4.21***	0.00***
-3 to 3	1.60%	46.89%	5.59***	4.38***	0.00***
-4 to 4	2.06%	47.18%	6.73***	5.02***	0.00***
-5 to 5	2.25%	44.92%	6.66***	5.00***	0.00***
-6 to 6	2.53%	45.34%	6.89***	5.17***	0.00***
-7 to 7	2.67%	44.92%	6.79***	5.09***	0.00***
-8 to 8	2.48%	46.47%	5.91***	4.54***	0.00***
-9 to 9	2.39%	45.20%	5.40***	4.14***	0.00***
-10 to 10	2.28%	46.05%	4.90***	3.83***	0.00***

Figure 7: Cumulative Abnormal Returns Around the Announcement in case 6.1

Compared to CASE 1, the similar shape of Figure 1 and Figure 7 shows significant positive abnormal returns a few days before the announcement date with or without cash dividend. Further, from the comparison of Figure 9, 10 and Figure 1, 2, I find more significant positive abnormal returns a few days before the announcement date with cash dividend. Therefore, cash dividend strengthened the market reaction of CASE 1. However, I observe completely insignificant abnormal returns on the announcement date with cash dividend. It is possible that news of cash dividend leaked out very fast. Knowing in advance by internal people accelerate the uptake of information.

CASE.6.2. Abnormal returns around the execution date

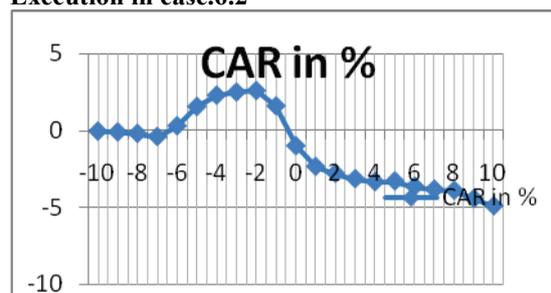
Table 11 and 12 and Figure 8 present the abnormal returns and the cumulative abnormal returns around the execution in case 6.2.

Table 11: Abnormal Returns Around the Execution in case.6.2.

Event date:	AR :	negative AR %:	t(BW):	simple-t:	p-value (Wt):
-10	-0.04%	53.03%	-0.38	-0.35	0.35
-9	-0.08%	52.89%	-0.83	-0.77	0.12
-8	-0.07%	52.19%	-0.69	-0.65	0.25
-7	-0.13%	55.71%	-1.25	-1.10	0.02**
-6	0.57%	43.72%	5.62***	4.88***	0.00***
-5	1.30%	37.80%	12.73***	9.10***	0.00***
-4	0.75%	44.85%	7.35***	5.59***	0.00***
-3	0.17%	49.65%	1.67*	1.38	0.62
-2	0.22%	53.17%	2.12**	1.08	0.51
-1	-0.95%	56.70%	-9.34***	-3.73***	0.00***
0	-2.73%	75.88%	-26.81***	-8.49***	0.00***
1	-1.29%	62.76%	-12.67***	-5.90***	0.00***
2	-0.54%	58.53%	-5.28***	-3.18***	0.00***
3	-0.38%	60.79%	-3.70***	-3.06***	0.00***
4	-0.23%	57.69%	-2.25**	-1.92*	0.00***
5	0.09%	53.03%	0.86	0.74	0.32
6	-0.30%	58.82%	-2.95***	-2.54**	0.00***
7	-0.12%	54.02%	-1.23	-1.07	0.06*
8	-0.20%	56.70%	-2.00**	-1.85*	0.00***
9	-0.48%	63.19%	-4.68***	-4.01***	0.00***
10	-0.48%	62.48%	-4.75***	-4.15***	0.00***

Table 12: Cumulative Abnormal Returns Around the Execution in case.6.2.

Event date:	CAR:	negative CAR %:	t(BW):	simple-t:	p-value (Wt):
-0 to 0	-2.73%	75.99%	-26.85***	-8.49***	0.00***
-1 to 1	-4.97%	71.33%	-28.23***	-10.50***	0.00***
-2 to 2	-5.30%	69.21%	-23.28***	-9.49***	0.00***
-3 to 3	-5.50%	67.37%	-20.44***	-9.52***	0.00***
-4 to 4	-4.98%	65.40%	-16.33***	-8.17***	0.00***
-5 to 5	-3.60%	59.75%	-10.67***	-5.66***	0.00***
-6 to 6	-3.33%	57.77%	-9.07***	-5.14***	0.00***
-7 to 7	-3.58%	59.75%	-9.08***	-5.41***	0.00***
-8 to 8	-3.85%	61.16%	-9.18***	-5.71***	0.00***
-9 to 9	-4.41%	61.16%	-9.95***	-6.38***	0.00***
-10 to 10	-4.94%	61.72%	-10.59***	-6.97***	0.00***

Figure 8: Cumulative Abnormal Returns Around the Execution in case.6.2

Compared to CASE 2, the similar shape of Figure 2 and Figure 8 shows significant negative abnormal returns two days before and after the execution date with or without cash dividend. Further, from the comparison of Figure 11, 12 and Figure 3, 4 I find, with cash dividend, significant positive abnormal returns 5 to 7 days before the execution date and significant negative abnormal returns around the ex-day. At the same time, I observe greatly significant negative abnormal returns on the ex-day. Therefore, cash dividend strengthened the market reaction of CASE 2.

3.4. Conclusion for the Six Cases Above

The results of six cases above show significant positive abnormal returns around the announcement date with or without cash dividend using different return models. This kind of significant positive abnormal return mostly appears 2 days before and on the announcement date, which indicates that the effective market reaction to the information, but the information is also likely to be

leaked ahead, so investors made action in advance. In that case, the China's stock market information disclosure system is still not standardized. Specifically, the news of dividend distribution had been let out a few days before the announcement date, some informed investors made action in advance, which not only did great harm to the interests of other investors, but also violated the principle of the security market (open, fair and just). Therefore, the relevant departments should further standardize the information disclosure system of listed companies. The tests of different years show that although notable positive abnormal return appears in every year, the amplitude of reaction varies considerably, especially the most obvious abnormal return appears in 2007.

The market reaction around the ex-day shows significant positive abnormal returns 5 days before the ex-day and significant negative abnormal returns around the ex-day with or without cash dividends using different return models. The tests of different years show that both positive and negative abnormal returns are very notable in 2007, but after that the significance reduced. This phenomenon can be explained by the rising China stock market in 2007.

3.5. Factor Analysis on the Announcement Effect

In this part, I mainly analyze the influence of the split ratio, cash dividends, firm characteristics and the overall market condition along with other factors over the announcement effect. Here the regression model I used is

$$\begin{aligned} CAR = & \delta_1 * Ratio + \delta_2 * Cash \\ & + \delta_3 * MarCap + \delta_4 * Market \\ & + \delta_A * CSRC_A + \delta_B * CSRC_B \\ & + \dots + \delta_M * CSRC_M + \varepsilon \end{aligned}$$

In which, the CAR refers to the accumulated abnormal returns around the announcement date, which is the summation of a total 11 days of abnormal returns in the event window[-5, 5] of the announcement date using the market return model. Ratio corresponds to the split ratio. Cash refers to cash dividends, which I am using here as a dummy variable, i.e. 1 stands for with cash dividend, 0 means without cash dividend. MarCap refers to the company size (unit: one billion), which is an estimation of the average daily circulated A share market value in the estimation window[-110, -11]. Market refers to the overall market situation, which is the summation of daily stock market returns in the estimation window[-110, -11] before the announcement. CSRC refers to the industry classification. In order to study the influence of industry over the abnormal returns, here I run regressions for industry classification⁷ separated as dummy variables

⁷ According to the "China listed company classification guidance", the 13 categories of listed companies are: A, farming,

from CSRC A to CSRC M. Table 13 and 14 respectively represent the regression analysis results of the equation and tests of the regression parameters and its significance.

Table 13: Regression Analysis Results of the Equation

Source	DF	Sum of Squares	Mean Square	F Value	Pr>F
Model	17	0.8484	0.0499	3.3600	<.0001
Error	330	4.9070	0.0149		
Uncorrelated Total	347	5.7555			
Root MSE	0.12194	R-Square	0.1474		
Dependent Mean	0.01844	Adj R-Sq	0.1035		
Coeff Var	661.42046				

Table 14: Parameter Estimation

Variable	Regressor	Estimate	Standard Error	t-Value	Pr> t
δ_1	Ratio	0.0914	0.0214	4.2700	<.0001
δ_2	Cash	0.0129	0.0157	0.8200	0.4107
δ_3	MarCap (Billion)	-0.0003	0.0005	-0.5900	0.5558
δ_4	Market	0.0591	0.0210	2.8100	0.0052
δ_A	CSRC_A	0.0205	0.0717	0.2900	0.7754
δ_B	CSRC_B	-0.0163	0.0416	-0.3900	0.6958
δ_C	CSRC_C	-0.0541	0.0177	-3.0600	0.0024
δ_D	CSRC_D	-0.1849	0.0627	-2.9500	0.0034
δ_E	CSRC_E	0.0427	0.0395	1.0800	0.2805
δ_F	CSRC_F	-0.0328	0.0298	-1.1000	0.2725
δ_G	CSRC_G	-0.0459	0.0290	-1.5800	0.1152
δ_H	CSRC_H	-0.0353	0.0347	-1.0200	0.3087
δ_I	CSRC_I	-0.0154	0.0751	-0.2000	0.8379
δ_J	CSRC_J	-0.0224	0.0289	-0.7800	0.4379
δ_K	CSRC_K	-0.0619	0.0509	-1.2200	0.2252
δ_L	CSRC_L	-0.0303	0.0884	-0.3400	0.7318
δ_M	CSRC_M	0.0208	0.0304	0.6800	0.4940

Table 14 shows that the higher the split ratio, the greater the abnormal returns. This can be explained that high split ratio shows the confidence of a company, and positive signal has been transmitted to the market. δ_2 shows that the sensitivity of abnormal returns to cash dividend is insignificant, namely under the premise of

forest, herd, fishery; B, mining; C, manufacturing; D, electricity, gas and water production and supply; E, construction; F, transportation, warehousing; G, information technology; H, wholesale and retail trade; I, finance, insurance; J, real estate; K, social services; M, comprehensive category.

stock splits, cash dividends do not affect abnormal returns notably. δ_3 shows that the sensitivity of abnormal returns to firm size is not significant, which means that the company scale do not affect abnormal returns directly. Significant positive δ_4 shows that the better the overall market condition, like in the bull market, the more positive abnormal returns. From δ_A to δ_M I find only the intercepts of the C industry(manufacturing) and the D industry(electricity, gas and water production and supply) are significant negative at the 0.05 confidence level, which means that few of industry itself has a stable abnormal returns. Namely, the difference of the response of abnormal returns around the announcement between different industry is not obvious.

3.6. Investment Strategy Analysis

3.6.1. The Basic Train of Thought

The prior empirical research shows significant positive abnormal returns around the announcement date and significant negative abnormal returns around the ex-day. Therefore, I will build an investment strategy according to these two phenomenon.

It is more difficult to construct investment strategy around the announcement date since in the normal circumstances investors have no internal information, namely, it is impossible for them to know information of stock splits in advance. Especially in China, the empirical results show that most of the positive abnormal returns appear a few days before the announcement date. Namely, informed investors have done a lot of trade in advance. As a result, it is hard for a investor with no private information to build an investment strategy in this market.

Considering market reaction around the ex-day, there are two cases. The first one is significant positive abnormal returns 4 to 6 days before the ex-day. This is a very good opportunity for investment. Yet, Figure 6 shows this opportunity is the most obvious in 2007, slightly notable in 2008, does not exist in and after 2009. Form today's viewpoint, this is most likely due to the overall market condition or the whole institutional investors use this strategy. The second case is negative abnormal returns 2 days before and after the ex-day. Figure 6 shows this phenomenon has been relatively stable from 2007 to 2010. Therefore, a reasonable investment strategy is that selling short a few days before the ex-day and buying back a few days after the ex-day. This kind of strategy is reasonable because of the following two reasons, although short selling is forbidden in China. On the one hand, the CSRC⁸ issued the "The Controls of Experimental Unit of Securities Margin Trading" in June 30,

⁸ China Securities Regulatory Commission.

2006(effective in August 1, 2006). Then the CSRC announced the launch of the experimental unit in October 5, 2008. In March, 2010, the CSRC opened partial short selling. So we have reason to believe that the range of short selling will be more wide in the next few years. On the other hand, for fund managers, they may have these stocks in their own portfolio. They just need to sell them out a few days before the ex-day and buy them back after the ex-day.

3.6.1. Investment analysis of risk and revenue

(1) Model construction

Here I construct the following model: selling short x days before the ex-day and buying back y days after the ex-day. Assume $0 < x, y < 10$. I use the equal weighted investment strategy for convenience, so I can directly sum stock returns up arithmetically. At the same time, cash dividends should be considered. Since abnormal returns are sensitive to the setting of parameters and assumptions, I use the absolute returns of stocks instead of the abnormal returns. I use the Sharp Ratio⁹, which means the excess return for every unit of risk, as the evaluation standard to study the risk and return of this investment strategy. The specific formula is $SR = [E(R_p) - R_f] / \sigma_p$. Here I apply the investment strategy above to calculate the return around the ex-day[- x , y] given sample in 2007 to 2010, then I try to find the optimal investment strategy by comparing Sharp Ratio at different x and y . In order to calculate simply, I assume the risk-free return is 0, i.e. $\mu(\text{riskfree}) = 0$.

(2) Data analysis and discussion

Table 15 and 16 present the Sharp index value at different x and y with and without cash dividend respectively.

Table 15: Sharp Index Value with No Cash Dividend

X/Y	0	1	2	3	4	5	6	7	8	9	10
0	2.77	1.96	1.39	1.07	0.09	0.91	0.84	0.84	0.85	0.89	0.83
1	2.28	1.48	1.25	1.04	0.94	0.96	0.91	0.92	0.91	0.93	0.85
2	2.18	1.47	1.29	1.09	1.01	1.04	1.00	1.00	0.98	0.99	0.90
3	1.26	1.09	1.08	0.95	0.92	0.97	0.95	0.98	0.96	0.95	0.85
4	0.59	0.66	0.74	0.68	0.68	0.73	0.72	0.79	0.79	0.77	0.68
5	0.01	0.17	0.27	0.20	0.21	0.27	0.27	0.36	0.41	0.40	0.36
6	-0.16	0.00	0.10	0.03	0.03	0.08	0.08	0.17	0.23	0.23	0.21
7	-0.28	-0.12	-0.03	-0.10	-0.11	-0.06	-0.06	0.02	0.10	0.10	0.10
8	-0.30	-0.16	-0.08	-0.15	-0.16	-0.11	-0.12	-0.04	0.04	0.04	0.05
9	-0.24	-0.10	-0.02	-0.09	-0.09	-0.05	-0.05	0.02	0.08	0.09	0.09

⁹ In 1990, the Nobel Prize winner William Sharpe starting from CAPM(capital asset pricing model) developed Sharp Ratio, used to measure the performance of financial assets. Sharpe, W. F. (1966). "Mutual Fund Performance". Journal of Business 39 (S1): 119–138.

10	-0.26	-0.14	-0.07	-0.12	-0.13	-0.09	-0.10	-0.03	0.03	0.03	0.04
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Table 16: Sharp Index Value with Cash Dividend

X/Y	0	1	2	3	4	5	6	7	8	9	10
0	4.44	2.16	1.71	1.79	1.84	1.60	1.61	1.42	1.15	1.15	1.20
1	4.08	2.28	1.84	1.96	1.94	1.67	1.66	1.46	1.22	1.21	1.26
2	5.93	2.16	1.72	1.86	1.88	1.60	1.61	1.41	1.14	1.14	1.21
3	2.11	1.34	1.19	1.33	1.34	1.13	1.14	1.01	0.83	0.86	0.94
4	0.54	0.63	0.63	0.73	0.74	0.60	0.62	0.54	0.44	0.49	0.56
5	-0.18	0.10	0.18	0.24	0.25	0.15	0.17	0.13	0.08	0.14	0.20
6	-0.42	-0.12	-0.03	0.01	0.02	-0.05	-0.03	-0.06	-0.09	-0.03	0.02
7	-0.34	-0.09	-0.01	0.02	0.03	-0.03	-0.02	-0.04	-0.07	-0.02	0.03
8	-0.33	-0.11	-0.04	-0.01	0.00	-0.06	-0.04	-0.06	-0.09	-0.04	0.00
9	-0.34	-0.14	-0.07	-0.04	-0.03	-0.08	-0.07	-0.09	-0.11	-0.06	-0.02
10	0.51	0.55	0.57	0.57	0.57	0.56	0.57	0.56	0.56	0.57	0.57

Table 15 shows that with no cash dividend, i can get the highest Sharp Index by selling short on the ex-day and buying back after the ex-day. Table 16 shows that with cash dividend, i can get the highest Sharp Index by selling short 2 days before the ex-day and buying them back on the ex-day. On the whole, I can get higher Sharp Index by using this investment strategy around the ex-day especially with cash dividends, and this kind of trading strategy can bring relatively stable and high yield. In order to further understand annual earnings of this specific trading strategy, I select the sample whose Sharp Ratio ≥ 2.5 to calculate the annual earnings. Table 17 presents the results.

Table 17: Annual Rate of Earnings of this Trading Strategy

	2007	2008	2009	2010	mean	std	Sharpe Ratio
[-0,0]No Cash	1.51%	1.22%	1.77%	2.72%	1.81%	0.65%	2.77
[-0,0]With Cash	3.25%	2.76%	1.83%	2.89%	2.68%	0.60%	4.44
[-1,0]With Cash	3.45%	4.20%	2.23%	3.54%	3.35%	0.82%	4.08
[-2,0]With Cash	2.74%	3.25%	2.16%	3.02%	2.79%	0.47%	5.93

Table 17 shows that the annual rates of earnings of these four trading strategies are relatively stable. Among them, the third strategy gets the highest yield, but at the same time it associates with the highest risk. Therefore, the fourth strategy is a better trading strategy since it has a highest Sharpe Ratio.

One of the advantages of this strategy is that capital can be used repeatedly, which can increase the leverage ratio. Because the execution distributes over a period of time instead of focusing on one day, the short margin required is greatly reduced in this period.

This strategy also associates with the following two risks: one is the instability over time. Although this strategy

can bring profits to investors from 2007 to 2010, there is no guarantee that it will work in the future, and the Sharp Ratio will experience a significant slowdown as more investors adopt this strategy. Secondly, since the strategy is short selling or closing, the rising market in the corresponding period will bring risks. The effect of rising market over the negative abnormal returns around the announcement will lead to loss of this strategy. However, this problem can be solved in two ways. First of all, the execution distributes along the time line evenly rather than focusing on one day, and cash will be allocated equally in different events. This will relieve the rising market problem. Secondly, this strategy can hedge part of the risk if it is used by fund managers. Specifically, they can make money rely on their main position when the stock market is rising, and they can get more money in the declined market based on this strategy. In fact, in this case, the main position of fund managers has an impact of hedging. Of course, it is possible for individual investors to sell short and buy the index or index futures to hedge the market risk. But the imperfections and defects of the China capital market system will bring some difficulties to individual investors.

4. CONCLUSION AND PROSPECT

This paper investigates the market reaction to stock splits based on China's A share companies between 2007 to 2010 by using empirical analysis. I find significant positive abnormal returns around the announcement date (especially before the announcement date) as well as four to six days before the ex-right date of China stock splits. I also observe significant negative abnormal returns just around the ex-right date. The above phenomenon is relatively stable even if the selection of samples and empirical models may vary, but the degree of this phenomenon might change overtime. The cross sectional regression of the abnormal returns for the announcement date shows that the phenomenon is sensitive to the split ratio and the overall market condition, and it is not sensitive to industry, company size and cash dividends. Therefore, combining with the empirical data I have constructed a high Sharpe ratio short selling investment strategy around the ex-right date. Then, the article further discusses the operability of the investment strategy and its stability over time.

The empirical results of this paper with Chinese characteristics are different from the United States market and results of Christian Wulff (2002). This is most likely associated with the one way market structure of no short selling and the vulnerable internal message. This paper not only put forward a feasible investment strategy for the abnormal return phenomenon, but also explore the underlying reason behind the abnormal returns around the announcement and execution day. In conclusion, this paper finds the direction for the future research.

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