# Empirical Analysis of Holiday Effect on Chinese Baijiu Stocks

Zongya Chen[1(✉)], Luyun Zhang[2], and Fangming Li[3]

[1] School of Accounting, Shanghai University of Finance and Economics, Shanghai 200433, China
kathyzc8_317@163.com

[2] School of Economics and Management, University of Science and Technology Beijing, Beijing 100083, China

[3] School of Social Science, University of Manchester, Manchester M13 9PL, UK

**Abstract.** The baijiu sector is a representative segment of the Chinese stock market. In 1994, the first Baijiu stock "Shanxi Xinghuacun Fen Wine Factory" was successfully listed on Shanghai Stock Exchange. After that the segment faced rapid development, increasing the number of related shares listed successfully. In 2022, the number of stocks in the sector has increased to 40. From an industry perspective, this paper takes Baijiu stocks listed on Shanghai Stock Exchange and Shenzhen Stock Exchange for more than 10 years between 2013 and 2022 as samples and analyzes the pre-holiday and post-holiday returns of Baijiu stocks by using the event analysis method. By comparing the abnormal returns, it is proved that the Baijiu sector is affected by the festival effect.

**Keywords:** Holiday Effect · Baijiu Industry · Quantitative Analysis · Event Study

## 1 Introduction

In financial markets, Eugene Fama [1] proposed the hypothesis of market efficiency which assumes the market price can perfectly reflect all the market information. Investors are rational and will take into account all relevant information before making certain decisions, such as whether to buy, sell, or keep securities. It is difficult for investors to continuously outperform the market. But the holiday effect posed a huge challenge to the efficient market hypothesis [2, 3].

The holiday effect has been one of the most prominent arguments for why stock returns have changed. In the past several decades, the holiday effect has been studied by many scholars as a key issue for their abnormal returns. The holiday is first identified by Fields [4]. After that, more and more scholars use different statistical methods and target objects to refine the research on the holiday effect. One of the most popular effect-January effect is investigated by Wachtel [5]. After that, Frank Cross [6] investigated the Monday effect. Kim and Park [7] have also developed research to show the holiday effect in the stock markets of the United Kingdom and Japan are independent of the holiday


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effect in the stock market of the United States. There are also many studies on the holiday effect in China. Lu and Liu [8] focusing on demonstrating the general holiday effect of the Chinese stock market. Yuan, Gupta, and Bianchi [9] used the GARCH model to explore the pre-holiday effect on China. They discovered that on the days leading up to holidays, Chinese stock returns are unusually greater than on regular trading days. Research into the holiday effect has become increasingly diverse and plentiful [10].

However, little research has been done to interpret the holiday effect of one of the most representative festivals in China, i.e. the Spring Festival. Furthermore, we also note that Baijiu trading is always busy during the festival. Therefore, this paper analyzes the Spring Festival effect in the Baijiu industry from 2013 to 2022 using the event study method and specifically analyzing 31 stocks that have been listed for more than 10 years. This paper is organized as follows: Chapter 2 introduces the average return (*AR*) and the cumulative average return of stocks (*CAR*) method. Chapter 3 analyzes the volatility comparison of *AR* and *CAR*.

## 2 Methodology and Data

To test the existence of the Spring Festival effect in Baijiu industry in the Chinese stock market, the event study method is used in this study. Standard event study methods include:

1. Define events and event windows. As shown in Fig. 1, T = 0 is the event day, T0 to T1 is the estimation window, T1 to T2 is event window and T2 to T3 is the after the event window.

Specific to this article, event window is T-5 to T + 5 and T is the Spring Festival Day. Estimation window is T-125 to T-6, meaning that we take 120 trading-days before the event window.

2. Select research samples. This study takes the Chinese Spring Festival from 2013 to 2022 as the research event and selects stocks of listed companies in Baijiu industry on China Stock Exchange. There are 31 stocks selected, which code are 000799, 600381, 600153, 600197, 600519, 000858, 600702, 002419, 000568, 600779, 002183, 002374, 000596, 002342, 600238, 002304, 000860, 600809, 600395, 600559, 600655, 600696, 002646, 600257, 000930, 600199, 600332, 000995, 600771, 600750, 600252.
3. Select the normal return model. This paper chooses market model as the estimation model of the normal return:

$$R_{it} = \alpha_i + \beta_i I_t + \S I_t \tag{1}$$

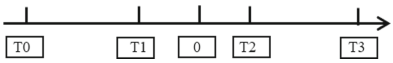


**Fig. 1.** Event Window

$R_{it}$ is the stock return rate of listed company, and it is the market return rate. We use Shanghai Stock Index or Shenzhen Stock Index, depending on the stock exchange where stocks are listed, to calculate the market return rate.

4. Calculate *AR* and *CAR*.

$$AR_{it} = R_{it} - ER_{it} \tag{2}$$

$ER_{it}$ is determined and calculated by the normal return model, $R_{it}$ is the actual return. On this basis, we calculate *AAR* and *CAR*. (T2 < t1 < t2 < T3)

$$AAR_i = \frac{1}{N}\sum_{i=1}^{N} AR_{it} \tag{3}$$

$$CAR_{(t1,t2)} = \sum_{t=t_i}^{t_2} AR_{it} \tag{4}$$

5. Test the significance of abnormal returns. This paper uses parametric test method, standardizing $CAR_{(t1,t2)}$ to test if *CAR* varies from zero significantly. The following are the test statistics:

$$J_2 = \sqrt{\frac{N(L_1 - 4)}{L_1 - 2}} \cdot \overline{SCAR_{(t1,t2)}} \tag{5}$$

$$\overline{SCAR_{(t1,t2)}} = \frac{1}{N}\sum_{i=1}^{N} \frac{CAR_{(t1,t2)}}{\sqrt{\sigma^2{}_{(t1,t2)}}} t(L_1 - 2) \tag{6}$$

$L_1$ is estimation window (T2-T1) and (t1, t2) is event period.

## 3 Statistical Analysis

The 10-day $AR_t$ and $CAR_t$ during the spring festival from 2013–2022 are shown below in Table 1.

Besides, Figs. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, and 11 illustrate the results and their trends more clearly. The t-test results of the standardized $CAR_t$ are shown in Table 2. According to these trends, we classify the annual data into three categories.

**Table 1.** Statistics of $AR_t$ and $CAR_t$

| | 2013 | | 2014 | | 2015 | | 2016 | | 2017 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | *AR* | *CAR* | *AR* | *CAR* | *AR* | *CAR* | *AR* | *CAR* | *AR* | *CAR* |
| −5 | −0.75% | −0.75% | 0.08% | 0.08% | 0.37% | 0.37% | 0.46% | 0.46% | −0.59% | −0.59% |
| −4 | 2.20% | 1.44% | 0.86% | 0.94% | −0.58% | −0.21% | −0.30% | 0.16% | −0.16% | −0.76% |
| −3 | −0.06% | 1.38% | −0.44% | 0.50% | 0.20% | 0.00% | −0.22% | −0.06% | 0.00% | −0.76% |
| −2 | 0.57% | 1.95% | −1.68% | −1.19% | 0.35% | 0.35% | −0.09% | −0.15% | −0.42% | −1.17% |
| −1 | 0.16% | 2.11% | −0.64% | −1.83% | −0.27% | 0.08% | 0.14% | −0.01% | −0.61% | −1.78% |
| 1 | −0.77% | 1.34% | 0.01% | −1.82% | 0.15% | 0.23% | −0.47% | −0.47% | 0.41% | −1.38% |
| 2 | 1.26% | 2.60% | 0.37% | −1.45% | 0.40% | 0.63% | −0.40% | −0.88% | 0.29% | −1.09% |
| 3 | 0.40% | 3.00% | 0.68% | −0.76% | 0.61% | 1.24% | −0.80% | −1.68% | 0.49% | −0.60% |
| 4 | 2.71% | 5.71% | 1.06% | 0.29% | 0.27% | 1.51% | −0.01% | −1.69% | 0.06% | −0.53% |
| 5 | 3.18% | 8.89% | −0.11% | 0.18% | −0.25% | 1.26% | −0.04% | −1.73% | 0.14% | −0.39% |
| | 2018 | | 2019 | | 2020 | | 2021 | | 2022 | |
| | *AR* | *CAR* | *AR* | *CAR* | *AR* | *CAR* | *AR* | *CAR* | *AR* | *CAR* |
| −5 | 2.12% | 2.12% | 0.13% | 0.13% | −0.13% | −0.13% | 0.25% | 0.25% | −1.39% | −1.39% |
| −4 | 0.72% | 2.84% | −0.20% | −0.07% | −0.49% | −0.62% | −1.65% | −1.40% | −2.22% | −3.61% |
| −3 | 0.84% | 3.68% | −0.38% | −0.45% | −0.07% | −0.69% | −2.38% | −3.78% | −1.00% | −4.61% |
| −2 | −0.66% | 3.02% | −0.38% | −0.83% | −0.96% | −1.65% | −1.38% | −5.17% | −0.17% | −4.78% |
| −1 | 0.86% | 3.88% | −0.43% | −1.26% | −0.63% | −2.29% | −0.63% | −5.79% | −1.65% | −6.43% |
| 1 | 0.51% | 4.39% | 0.77% | −0.49% | −1.64% | −3.93% | −0.80% | −6.60% | −1.06% | −7.49% |
| 2 | −0.39% | 4.00% | −0.08% | −0.57% | −2.58% | −6.50% | 0.82% | −5.77% | −0.08% | −7.57% |
| 3 | −0.26% | 3.75% | −0.98% | −1.54% | 0.49% | −6.01% | −1.40% | −7.17% | 1.68% | −5.89% |
| 4 | 0.81% | 4.55% | 1.23% | −0.32% | 0.06% | −5.95% | 0.88% | −6.29% | −0.28% | −6.16% |
| 5 | −0.91% | 3.64% | 0.09% | −0.22% | −0.46% | −6.41% | −1.08% | −7.37% | 0.25% | −5.91% |

The first category includes Year 2013, 2015 and 2018, the data of which are depicted in Figs. 1, 3, and 6 respectively. The $CAR_t$ in these years shared a similar upward trend, indicating an overall positive holiday effect. In 2013, the $CAR_t$ within the event window (−5,5) followed a generally upward trend while it grew more rapidly after the festival than it did before the festival. It is also noteworthy that the $CAR_t$ of the first trading day after the festival was below zero. In 2015 and 2018, the $CAR_t$ almost remained positive all the time within the event window and kept climbing up.

The second category includes Year 2014, 2017 and 2019, the data of which are shown in Figs. 2, 5, and 7 respectively. The line charts of $AR_t$ and $CAR_t$ in these years were characterized by one or several V-shapes, which implied more indicate holiday effect in these years. In 2014, before the festival, $AR_t$ and $CAR_t$ simultaneously rose before went down while after the festival, they first went up then fell in the end. The lowest point of the V-shape appeared on the last two or the last trading day before the festival. In 2017, it is clear from Fig. 5 that both the line charts of $AR_t$ and $CAR_t$ were V-shaped with the lowest point on the last trading day before the festival. In 2019, the $CAR_t$ continued dropping until the stock market was closed for the festival. After the festival, both $AR_t$

**Table 2.** T-test result of the standardized $CAR_t$

| Event window | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|
| (−5, −1) | | | | | *** |
| (−2, 2) | | * | | ** | *** |
| (1, 5) | | * | | *** | *** |
| Event window | 2018 | 2019 | 2020 | 2021 | 2022 |
| (−5, −1) | | ** | ** | ** | *** |
| (−2, 2) | | *** | *** | *** | *** |
| (1, 5) | | ** | *** | *** | *** |

*** 1% Sig.; ** 5% Sig.; * 10% Sig.

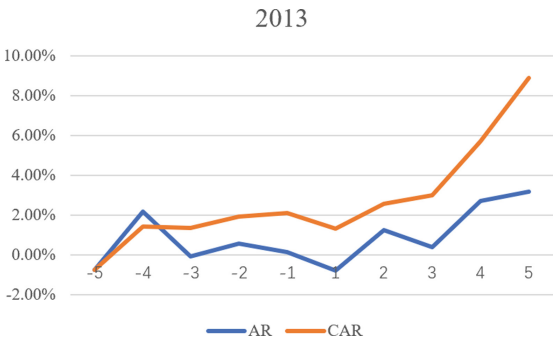


**Fig. 2.** Statistics of *AR* and *CAR* in 2013

and $CAR_t$ fluctuated a lot, reaching the lowest point on the third trading day after the festival.

The third category includes Year 2016, 2020, 2021 and 2022, the data of which are shown in Figs. 4, 8, 9, and 10 respectively. The $CAR_t$ of these years all followed a downward trend, indicating an overall negative holiday effect. Surprisingly, for the consecutive three years starting from 2020, the $AR_t$ and $CAR_t$ follow a highly similar pattern. For the $AR_t$, there was always more fluctuation after the festival than before the festival and the $AR_t$ of these three years all floated around zero. For the $CAR_t$, Year 2020, 2021and 2022 all witnessed a downside slope within the event window. However, the $CAR_t$ of 2020 displayed a higher decreasing rate after the festival than before the festival while the $CAR_t$ of 2021 and 2022 decreased more rapidly before the festival than after the festival.

From stated above, we come to the conclusion that Baijiu industry stocks showed different return and volatility patterns before and after the Spring Festival from 2013 to 2022. While Year 2013, 2015 and 2018 showed a positive holiday effect, Year 2016, 2020, 2021 and 2022 showed a negative holiday effect. Besides, Year 2014, 2017 and 2019 showed a volatile holiday effect.

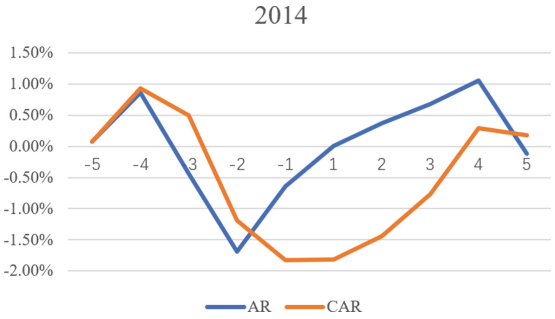


**Fig. 3.** Statistics of *AR* and *CAR* in 2014

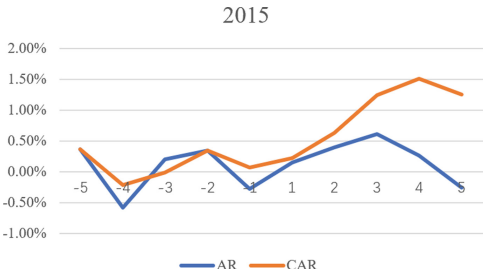


**Fig. 4.** Statistics of *AR* and *CAR* in 2015

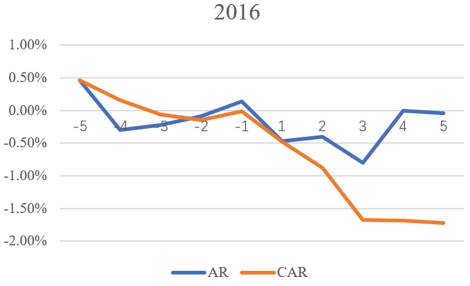


**Fig. 5.** Statistics of *AR* and *CAR* in 2016

In order to gain an insightful overview of the ten-year period, we further calculated the average $AR_t$ and average $CAR_t$ of the ten years' period. As is shown in the Fig. 12, the overall trend of average $CAR_t$ is downward until the third trading day after the festival and it decreased more rapidly before the festival than after the festival, which is fairly similar to the pattern of year 2021–2022. Therefore, we have reason to hypothesize that the ten-year average $CAR_t$ has a similar pattern as the $CAR_t$ of 2020–2022.

$$AAR_t = \frac{1}{10}\sum_{n=1}^{11} AR_t \tag{7}$$

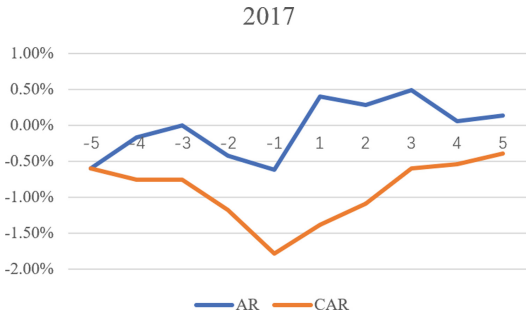


**Fig. 6.** Statistics of *AR* and *CAR* in 2017

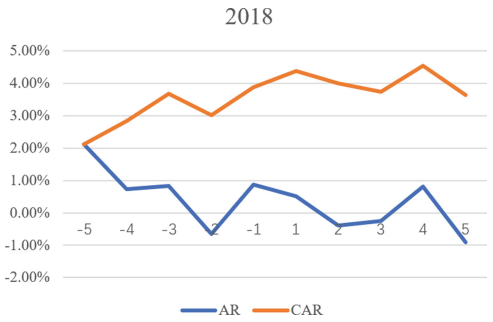


**Fig. 7.** Statistics of *AR* and *CAR* in 2018

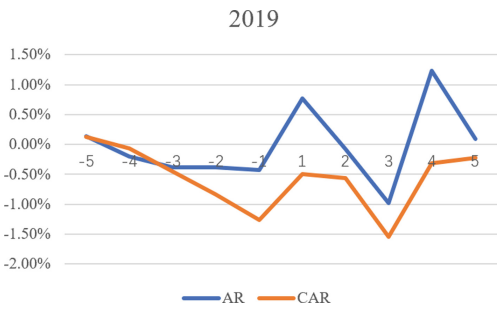


**Fig. 8.** Statistics of *AR* and *CAR* in 2019

$$ACAR_t = \sum_{t=t_1}^{t_2} AAR_t, T_2 < t_1 < t_2 < T_3 \tag{8}$$

In order to test this hypothesis, we obtain the Pearson Correlation Coefficients of these 4 sets. The result is shown in Table 3. According to these Pearson Correlation Coefficients, we our hypothesis is tested and we can come to the conclusion that the ten-year average $CAR_t$ has a similar pattern as the $CAR_t$ of 2020–2022.

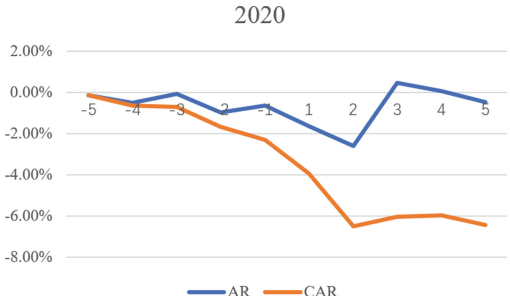


**Fig. 9.** Statistics of *AR* and *CAR* in 2020

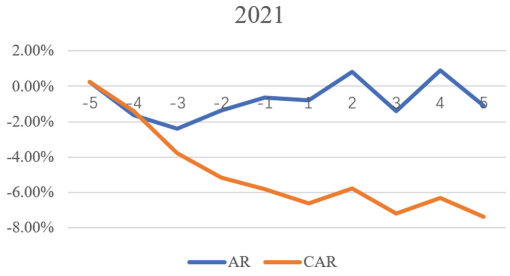


**Fig. 10.** Statistics of *AR* and *CAR* in 2021

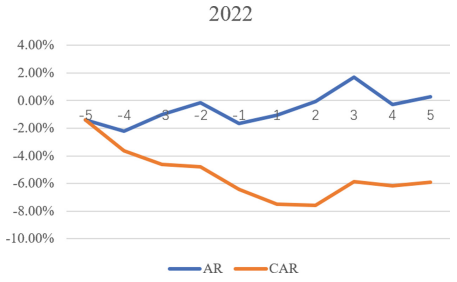


**Fig. 11.** Statistics of *AR* and *CAR* in 2022

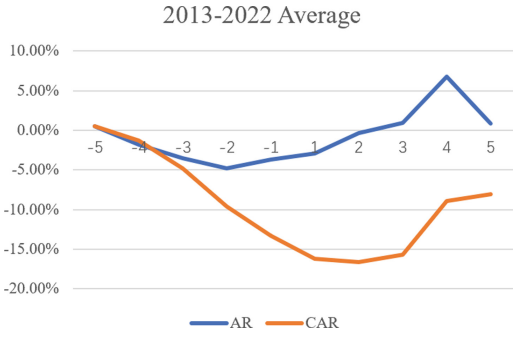


**Fig. 12.** The 10-year average statistics of *AR* and *CAR* between 2013 and 2022

**Table 3.** Result of the Pearson Correlation Coefficients

| | 2020 | 2021 | 2022 | Average |
|---|---|---|---|---|
| 2020 | 1 | 0.811** | 0.739* | 0.684* |
| 2021 | 0.811 | 1 | 0.877** | 0.83** |
| 2022 | 0.739 | 0.877 | 1 | 0.905** |
| Average | 0.684 | 0.83 | 0.905 | 1 |

**1% Sig.
*5% Sig.

## 4 Explanation

The possible explanation of the holiday effect is based on behavioral finance. Investors in the financial market are not completely rational, either due to personal preferences or erroneous ideas, so they always make subjective judgments on the trend of the stock price through incomplete market information. As a result, the fluctuation of the stock price is not only dependent on the change of stock intrinsic value but also subject to the psychological change of investors. Kavanagh and Bower [3] noticed that according to the behavior argument, happier individuals are more likely to believe in more favorable outcomes [11].

The Chinese have a reputation for being superstitious people. Superstition-based thinking and conduct has grown inextricably linked to Chinese society, and it is widely accepted. Chinese stock market exhibits the same superstitious tendency. In the New Year, investors are typically optimistic about the stock market. Chinese investors tend to drive the China really strong start to the New Year is a good omen for the stock market, predicting a smooth and prosperous year ahead, so they plan to encourage share price growth. People's behavior is very likely influenced by the Chinese New Year which promotes the existence of the holiday effect [12].

In addition, custom is an important factor that influences returns. Baijiu is a necessary gift for Chinese visiting relatives and friends during the Spring Festival, which has a special complex for Chinese people. This will enhance demand for it, resulting in greater sales income and profit. The stock price is affected as a result of this.

However, the COVID-19 epidemic has spread around the world, affecting the economies of all countries. He, Niu, Sun, and Li [13] using the composite index method proves COVID-19 has a significant influence on the Chinese catering business. Although the virus has been contained in China, the expansion of the disease outside of China, as well as its negative influence on the global economy, may pose new hurdles to China's economic progress. China has made every effort to avoid and contain the epidemic, to prevent large-scale population migration and clustering, and to apply quarantine at home. It forbade people to visit friends and relatives and gather for meals which reduced consumption of liquor. This resulted in a sharp drop in sales and profits during the Chinese New Year. It brings a negative impact on the stock price changes.

## 5 Conclusion

In this paper, taking the Shanghai A-share index and Shenzhen A-share index and the liquor stocks listed for more than 10 years from 2013 to 2022 as samples, the event study method is used to analyze the changes in stock excess returns in the five trading days before and after the New Year from 2013 to 2022, and the significance test is conducted. In Year 2013, 2015, 2019, the festival effect played a significant positive impact, which greatly increased the excess returns of Baijiu stocks, but in 2020–2022, due to the impact of COVID-19, the holiday effect showed a negative trend. Except for the abnormal fluctuation of the liquor sector in 2016, the liquor sector was slightly affected by the holiday effect in other years. Our research only focuses on the most traditional festival in China, the New Year. We hope to further understand the influence of other festivals, such as tomb-sweeping day, on the liquor plate in China, and verify whether the liquor plate is influenced by foreign famous festivals (e.g., Christmas holiday). So that to draw a more comprehensive on the holiday effect of the Chinese Baijiu industry. We hope this research can provide helpful information for liquor plate research.

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