Calendar Effect in The Chinese Securities Market

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Abstract. The existence of the calendar effect as a market anomaly problem proves that there are loopholes in the Efficient Market Hypothesis (EMH). By studying the calendar effect, scholars can gradually identify and solve the problems of regulatory loopholes and information asymmetry in the financial market. This paper divides the Chinese securities market into stock market, bond market, fund market and financial derivatives market, focusing on the weekday effect and the month effect. By summarizing and comparing the weekday effect and the month effect of the above four sub-markets, the paper shows that the calendar effect is more significant in all four markets on Mondays and Fridays, also January and December. The calendar effect of the four sub-markets is not similar in other periods, which may be due to the fact that each market is affected by uniform regulation and the same policies, but also has its own unique characteristics. The purpose of this paper is to summarize the research results on the calendar effects in the four sub-markets of the Chinese securities market and to promote the development and maturity of the Chinese securities market.

Keywords: Securities market; calendar effect; weekday effect; month effect.

1. Introduction

The Efficient Market Hypothesis (EMH) is an important part of the foundation of modern financial theory. The Efficient Market Hypothesis assumes that market price fluctuations of assets are randomly moving and that traders cannot predict market prices from historical data or various information [1]. However, an empirical approach to the study of investment behavior in financial markets leads to a problem that cannot be solved by classical financial theory, namely "market anomalies" [2]. The calendar effect is one of the problems of market anomalies, which refers to the phenomenon of excess returns in the market at certain times [2]. The calendar effect includes weekday, month, quarter, year and holiday effects [2]. In 1930, Fred C. Kelly first discovered the calendar effect, which is the systematic and significant difference in the level of returns of a security with respect to a specific time or date [2].

Subsequently, scholars from various countries have conducted studies on the calendar effect. By studying the return performance of Chinese securities market indices in different periods, Fang found that all three indices studied showed significant Monday and Friday effects [2]. Xiong found different excess returns in different periods by studying data related to the Chinese securities market [3]. Liu et al. [4] by studying the effect of air pollution on the stock prices of new energy companies, concluded that investor attention is an important reason to influence the stock prices and make the calendar effect. Qiao et al. [5] consider that the market has not reached the weak efficient market level as the main reason for the calendar effect. Gao and Luo [6] argue that the existence of the calendar effect partly explains the ineffectiveness of the market and at the same time can reveal some problems in the stock market, such as speculative trading, fund shady, imperfect information disclosure and market manipulation. Studying the calendar effect can help China to establish a better securities market and can help the securities regulator to improve its regulatory measures, enhance the regulatory efficiency and market efficiency of the securities market, guide the direction of investment, and improve the pricing efficiency of the securities market [6]. In this paper, by subdividing the Chinese securities market into the stock market, bond market, fund market, and financial derivatives market, and looking for research findings on the calendar effect in the four markets, the author finds that there are more research findings on the weekday effect and month effect. So, this paper focuses on the weekday effect as well as month effect and analyzes the similarities and

differences of them in the four sub-markets by summarizing the characteristics and causes of the weekday effect as well as month effect in the four sub-markets.

The remainder of this paper is organized as follows: Section 2 reviews the characteristics and reasons of the weekday effect in the four sub-markets as well as the month effect in bond and fund markets, and then compares the differences of them as well; Section 3 gives the conclusion of this paper.

2. Characteristics and causes of calendar effects in the securities market

The securities market can be mainly divided into four markets: stock market, bond market, fund market and financial derivatives market. By reading and summarizing the literature related to the weekday effect and month effect in the Chinese securities market and comparing the similarities and differences of them in different markets, the author hopes to achieve the purpose of facilitating future research on the calendar effect in the securities market.

2.1 The stock markets

2.1.1 Characteristics of the calendar effect in the stock market

Fang points out that there is a significant Monday effect in China's securities market in the long run, while there is a weekday effect in the short run but not definitively on a particular day of the week [2]. By selecting the closing prices of the SSE Composite Index, SZSI and CSI 300 Index for a total of 560 trading days from November 2008 to March 2011 as research data, Fang found through his study that the SSE Composite Index, SZSI and CSI 300 Index show a significant Monday effect within 560 trading days [2]. The SSE Composite Index, the Shenzhen Composite Index and the CSI 300 Index all show significant Monday effects within the period when the general market is on the rise [2]. The SZSI also shows significant Tuesday and Wednesday effects; the CSI 300 index shows significant Wednesday and Thursday effects [2]. The SSE Composite Index, SZSI and CSI 300 do not show significant weekday effects when the market is in a downward sideways period [2]. The SSE Composite Index, the Shenzhen Composite Index and the CSI 300 Index show significant Monday effects when the market is in an upward sideways period; the Shenzhen Composite Index also shows a significant Friday effect [2]. From this, Fang concludes that in the long run, there is a significant Monday effect in the Chinese securities market, i.e., the average return on Monday is much higher than the average return on any day of the week and is statistically significantly positive [2]. In the short term, there is also a Tuesday, Wednesday and even Thursday effect when the broad stock market is in the rising period; in the falling sideways period, the weekday effect is not significant; and in the rising sideways period, there is also a significant Friday effect in addition to the significant Monday effect [2].

Qiao et al. [5] reach a slightly different conclusion from Fang [2] by studying the weekday effect of the SSE Composite Index. By summarizing the Monday-Friday returns of the SSE Composite Index from 2006 to 2019, they found that since 2006, the overall average daily increase and decrease of the SSE Composite Index on weekday trading days showed an "N" pattern, and the average daily increase on Mondays was larger and had a higher probability of increase, while on Thursdays there was a larger average daily decrease and a higher probability of the up effect on Monday and the down effect on Thursday are both statistically significant, so it can be assumed that there are two effects on the SSE Composite Index [5]. After combining various statistical indicators, they find that the SSE Composite Index is more likely to have weekday effects on Mondays, Tuesdays and Thursdays [5].

2.1.2 Reasons for the calendar effect in the stock market

According to Fang [2], the main market investors' choice of risk-averse strategies and early selling to avoid tying up funds are the main reasons for the "Monday and Thursday effect". The reason for the significant long-term Monday effect is related to the trading system of the Chinese stock market, i.e., the Chinese stock market has a five-day-a-week trading system [2]. At the same time, the Chinese

stock market implements the buy T+1 clearing system, i.e., bought stocks need to wait until the next day to sell, so that stocks bought on Friday must wait until the following Monday at the earliest to be realized, and therefore market investors need to bear the uncertainty that arises when the market is closed for two days over the weekend, and the uncertainty in the international and domestic markets is the main reason for the significant Monday effect in the Chinese stock market in the long run [2, 5-6]. In Qiao, Mao and Ma's study, they argue that investors' risk aversion strategies are the generating cause of a large number of stocks being sold on Thursday to avoid capital ties, hence the existence of a significant Thursday down effect [5].

The general market is in a downward sideways period, which is often accompanied by a decline in volume, when most investors in the market will choose to wait and see, causing a decline in trading activity, making there is no significant weekday effect on the daily returns of stocks [2]. When the broad market is in an upward sideways period, the market has equal strength between the long and short sides, and the volume is steadily increasing, investors at this time will often choose to change their investment direction in the gap between Friday and Monday, making the daily return of stocks have a significant Monday and Friday effect [2]. When the broad market is in a unilateral rising market, the market is stronger on the long side, and there is a significant Monday effect in the market at this time; the Shenzhen securities market, which has a large proportion of small- and medium-cap stocks, shows the Tuesday and Wednesday effect because of the continuous appearance of subject stocks [2]. Gao and Luo also believe that investors will have different psychological states when they are in a bull or bear market, which will affect the date they buy or sell stocks, resulting in different weekday effects in the stock market during bull and bear markets [6].

2.2 The bond markets

2.2.1 Characteristics of the calendar effect in the bond market

Yang selected five sections of data for the study of calendar effects in bond markets and found that there were positive weekday effects in the Treasury and corporate bond markets of the Shanghai Stock Exchange on Tuesdays, Wednesdays and Fridays, and the three statistical methods of descriptive statistics, least squares estimation with dummy variables included and GARCH/EGARCH models tested were consistent [7]. For the Interbank Treasury Bonds and corporate bond markets, the three methods did not yield uniform conclusions [7]. However, the Interbank Treasury Bonds market passed the significance tests of both OLS and GARCH models on Thursday, which is also consistent with the descriptive statistics, and therefore, it can be concluded that there is a positive Thursday effect in the Interbank Treasury Bonds market, i.e., yields are higher on the day of Thursday than on other trading days of the week [7].

For descriptive statistics with month as the period, Yang finds that January and December yields are significantly higher than other months, while other months show a fluctuating trend with no clear high or low, and only April and October yields are negative [7]. Compared to the average daily returns, the data with month-based statistics also have higher average returns, although they are more volatile [7].

2.2.2 Reasons for the calendar effect in the bond market

Regarding the weekday effect, Yang [7] believes that it is mainly due to the fact that the People's Bank of China (PBOC) often announces information about the issuance of short-term central bank bills on Tuesdays and Thursdays, which affects the market's judgment of the central bank's monetary policy and thus has an impact on bond market transactions.

As for the month effect, Yang believes that the Chinese bond market is similar to foreign bond markets in that there is a "January effect", which is due to the following reasons: first, the tax reduction selling hypothesis, i.e., investors tend to sell bonds at the end of the year to offset their losses against their profits for tax reduction purposes; second, the window effect hypothesis, i.e., investment institutions will sell bonds with lower yields and buy bonds with higher yields at the end of the year for the purpose of beautifying statements to attract investors; third, capital demand

pressure, i.e., the capital pressure on financial institutions due to the massive growth in consumption on the eve of the Spring Festival, which forces them to release funds before the growth in consumption [7]. The above three causes together lead to the month effect in the Chinese bond market.

2.3 The fund markets

2.3.1 Characteristics of the calendar effect in the fund market

The data selected by Pan and Gao [8] are from 350 equity open-end funds from January 1, 2006 to June 30, 2013. The two also selected the CSI 300 index as an indicator to reflect the overall fund market situation [8]. The test of the CSI 300 index shows that the average returns of the Chinese A-share market are significantly higher on Mondays and lower on Tuesdays and Thursdays than those on other days, but open-end equity funds do not show certain characteristics as a whole [8]. In the phased "weekday effect" test, the CSI 300 index shows a significantly higher average return on Mondays and a significantly lower average return on other days in the bullish phase, which is consistent with the overall performance of open-end equity funds [8]. In the bear market phase, the average return is significantly lower than the average on Mondays and significantly higher than the average on Wednesdays, while the opposite is true for open-end equity funds, which show more significant high returns on Mondays and some significant low returns on other days [8]. During the oscillation phase, the CSI 300 index showed significantly low returns only on Tuesdays and not on other days, while open-end equity funds still had more significant high returns on Mondays and Fridays and more significant low returns on Wednesdays [8].

Fu [9] selected all actively managed open-end equity funds established before December 2003 for the study and excluded 36 of them as index funds. Fu's study finds that: excess returns do exist for funds at the end of the year or quarter compared to market returns, while excess returns drop significantly at the beginning of the year or the first trading day of the quarter; there is no significant difference between excess returns at the end of the month and the beginning of the month; funds' returns are due to the market portfolio in the last trading day of the semi-annual and annual periods, but lag behind the market portfolio in the first trading day The fund has the phenomenon of pulling up the percentage of stock holdings in the last ten minutes of the semi-annual and annual year-end [9].

2.3.2 Reasons for the calendar effect in the fund market

Pan and Gao [8] argue that the volatility of funds is strongly linked to the volatility of China's A-shares, but they also acknowledge that there are differences between the two and therefore argue that the reason for the existence of the weekday effect in funds should be further explored.

Combined with the intrinsic motivation of funds, Fu argues that the calendar effect exists because funds continue to purchase their holdings on specific dates in order to obtain better performance making their prices rise [9]. Since the performance reports published by funds at the end of the year are noticed by the market and investors as a criterion for continuing to hold the fund, funds may actively pull up their holdings at the end of the year in order to ensure the performance to keep investors in the fund [9].

2.4 The financial derivatives market

2.4.1 Characteristics of the calendar effect in the financial derivatives market

Li [10] selects daily data for soybean, strong wheat, copper, aluminum and fuel oil futures in the Chinese futures market. Due to the limitations of data collection itself, the time frames for the five futures data are not the same [10]. All of the above data periods exclude Chinese legal holidays [10]. Li finds that there is a certain weekday effect for both returns and volatility in China's futures market, and the weekday effect for returns is stronger than the weekday effect for volatility, with returns and volatility for each future being positive on Mondays, which is greater than the returns and volatility for other trading days; the Monday effect for returns is significantly positive, while only the Monday

effect for volatility for soybean futures is statistically significant [10]. Also, the study found asymmetry and agglomeration of volatility in China's futures market [10].

When data were obtained from the return data of the China coastal coal derivatives contract Qinhuangdao-Shanghai route from February 2014 to December 2017, Wang [1] found an overall upward trend in returns during the week, with negative values on both Monday and Wednesday and the highest and less volatile returns on Friday. And by further analysis, it is found that the derivative yield series on Wednesday is significantly negative and more volatile, and the absolute value of Friday's yield is larger and significantly positive, while the volatility of Friday's derivative yield is the least [1]. Therefore, it can be concluded that there is a significant Wednesday down effect and Friday up effect for China coastal coal derivatives, i.e., a significant weekday effect [1].

Liu Jiao used gold futures as the research object and selected the daily closing prices of Shanghai gold futures from January 2015 to November 2019 as the data sample for the study, and the results showed that among Monday to Friday, only the average return of Tuesday was negative, while the rest were positive [11]. And the mean values of Friday and Monday are significantly higher than the other days, showing a weekly calendar effect of positive returns [11].

2.4.2 Reasons for the calendar effect in the financial derivatives market

The phenomenon that there is a significant weekday effect of positive Monday returns in China's futures market can be explained to some extent by the cross-market message infection hypothesis, according to Li [10]. Previous studies have shown that the Friday positive calendar effect often exists in foreign financial markets, while the Monday positive calendar effect exists in the weekly country futures market, which may be caused by the transmission of the Friday effect in the international futures market, in line with the theory of the cross-market message contagion hypothesis [10].

For the weekday effect in the Chinese coal shipping derivatives market, Wang argues that the reason may be related to the influence of investors' decisions in the market [1]. Considering that shipping derivatives trading has been developed in China for a relatively short period of time, traders are not skilled and less experienced in market trading, and considering that most of the traders in the market are non-professionals, less rational investors may account for the majority of the market, and they are easily influenced by factors such as personal emotions to buy or sell financial derivatives [1]. Friday is close to the day of rest, when investors usually tend to have an optimistic estimate of the overall market situation and therefore buy more derivatives, contributing to the Friday rally effect [1]. There is a certain mutual influence relationship between derivatives and the freight market. Each Monday accumulates the information shock of three days including the rest day, which makes the freight market fluctuate to a certain extent and then transmits to the derivatives market, which may cause the derivatives to change significantly on Wednesday [1].

From the perspective of information transmission, in the study of Guo et al., it is shown that the yield changes on Monday include the information shock of three cumulative days from Saturday to Monday, such as the government's macro policies and important announcements of listed companies are more inclined to be announced on the weekend, which leads to significantly greater volatility on Monday than on other trading days [12].While the high volatility will trigger many investors' aversion to risk, coupled with the corresponding risk control measures of the exchange [12]. The implementation of corresponding risk control measures by the exchange makes Tuesday and Wednesday less volatile [12]. When government policies or company announcements start to take effect on Monday, a few more experienced investors open positions on the low side and go long on stock index futures to raise prices, and then other investors follow suit and open positions, and prices climb rapidly on Tuesday due to the herding effect [8].At that time, based on prospect theory, investors' risk aversion becomes stronger when asset prices are too high, and a large number of investors close their positions or establishing short positions, thus causing Wednesday's price to fall [12].

2.5 Comparison of the four sub-markets

Table 1 summarizes some of the models used in the literature and the conclusions drawn. Through the comparison of calendar effects in different markets, the author founds that: among the weekday effects, the Monday and Friday effects are more common in the four markets, which can be seen in table 1. And the returns of the other three days of the week have different performances in different markets or different periods of the same market. According to table 1, the month effects are concentrated on the January and December effects. But there is no uniformity in the returns of other months.

Table 1. Weekday effects in the four financial markets

Market	Methodology	Author(s)	Main findings
The stock market	EGCRAH model	Jie Fang	In the long run, there is a significant Monday effect in the Chinese securities market; In the short run, there is also a Tuesday, Wednesday and even Thursday effect in the rising stock market; in the falling sideways period, the weekday effect is not significant; in the rising sideways period.
The bond market	Simple descriptive statistics; OLS; GARCH model	Tingting Yang	There are positive weekdayeffects in the Treasury and corporate bond markets of the Shanghai Stock Exchange on Tuesday, Wednesday and Friday; for the Interbank Treasury Bonds and corporate bond markets, the three methods do not yield uniform conclusions.
The fund market	$R_t=\beta_1+\beta_2 d_{2t}+\beta_3 d_{3t}+\beta_4 d_{4t}+\beta_5 d_{5t}+\varepsilon_t$	KePan; Xthe authoraoyan Gao	In the phased "weekday effect" test, the CSI 300 Index shows a significantly higher average return on Mondays and a significantly lower average return on other days during the bullish phase; in the bear market phase, the average return is significantly lower than the average on Mondays and significantly higher than the average on Wednesdays.
The Financial Derivatives Market	GLS	Jianqiang Li	Li finds that there is a certain weekday effect for both returns and volatility in China's futures market, and the weekday effect for returns is stronger than the weekday effect for volatility.
	EGAECH model	Siyuan Wang; Jingjing Pan; Xiaojie Liang	The overall trend of the yield increases during the week, with negative values on Monday and Wednesday, and the highest and less volatile yield on Friday
	EGARCH model	Jiao Liu	Among Monday to Friday, only Tuesday has a negative average return, while the rest are positive. And the average values of Friday and Monday are significantly higher than other dates, showing the weekly calendar effect of positive returns

3. Conclusion

The existence of the calendar effect proves that there are loopholes in traditional finance theory. Through the research on the calendar effect, scholars from various countries have found that the causes of the calendar effect are closely related to the ineffectiveness of the market. At the same time, the calendar effect also indicates that there are some problems in the financial market, such as inadequate regulation. This paper firstly locates the calendar effect in the Chinese market, then subdivides the Chinese securities market into four sub-markets: stock market, bond market, fund market and financial derivatives market and collects research results on the calendar effect in these four markets respectively, and finally summarizes and compares the data and findings, and finds that the calendar effect in the four sub-markets has similarities and differences. The similarities lie in the

fact that the weekday effect is more significant for Monday and Friday, the month effect is more significant for January and December, and the calendar effect is different for the other sub-markets at other times. Thus, although the calendar effect is prevalent in all four markets, the characteristics and causes of the calendar effect are different. This paper argues that the similarities come from the fact that China's securities market is under unified regulation and is all influenced by the central bank or government departments, while the differences come from the different trading methods in different markets, the psychology of investors, and the timing of the development of financial products in the market. For example, the fund market creates the need to decorate financial statements because it needs to attract more investors, which leads to its calendar effect. By summarizing the literature, this paper finds that more scholars believe that the Chinese securities market has special characteristics, so they cannot directly apply the results of foreign research on the calendar effect, but should conduct research and analysis according to the actual situation of the Chinese securities market. Although there are many studies on the calendar effects of different financial markets at this stage, there are few papers that summarize and compare the calendar effects of different financial markets. This paper aims to fill this gap while providing research references for scholars in related fields to achieve the purpose of promoting the future good development of China's securities market. Meanwhile, this paper does not focus on the parts of calendar effects such as seasonal effects and holiday effects, which the author will give attention to in the subsequent research.

References

[1] Wang Siyuan, Pan Jingjing, Liang Xiaojie. A study on the calendar effect of shipping finance derivatives in China. Research in Technology Economics and Management, 2020, 3: 77-81.

[2] Fang Jie. An empirical test of weekday effects in Chinese securities market. Journal of Fujian Higher Institute of Commerce, 2011, 3: 89-93.

[3] Xiong Xiong, Meng Yongqiang, Li Xiao, et al. An empirical analysis of the Adaptive Market Hypothesis with calendar effects: Evidence from China. Finance Research Letters, 2019, 31.

[4] Liu Fengqi, Kang Yuxin, Guo Kun, et al. The relationship between air pollution, investor attention and stock prices: Evidence from new energy and polluting sectors. Energy Policy, 2021, 156.

[5] Qiao Guorong, Mao Jingning, Ma Yao. A brief analysis of the calendar effect of the SSE Composite Index. Financial Economics, 2020, 9: 56-64.

[6] Gao Qiong, Luo Nanying. Does the weekday calendar effect really exist in Shanghai and Shenzhen stock markets? -- A study based on bull and bear market heterogeneity. Journal of Shandong University of Technology (Social Science Edition), 2021, 5: 34-41.

[7] Yang Tingting. An empirical study of the calendar effect in the Chinese bond market. Beijing:Peking University, 2009.

[8] Pan Ke, Gao Xiaoyan. Week and month effects of Chinese funds - A phased study based on open-end equity funds. Modern Enterprise Education, 2013, 17: 83-85.

[9] Fu Aiguo. Calendar effects of fund behavior and fund performance. Economic Theory and Economic Management, 2008, 5: 39-45.

[10] Li Jianqiang. A study of the weekly calendar effect in the Chinese futures market. Financial Economics, 2009, 18: 84-86.

[11] Liu Jiao. An empirical study on the weekly calendar effect of Shanghai gold futures. Bohai Rim Economic Outlook, 2020, 4: 167-168.

[12] GuoKang, Su Zixian, Liu Ziwei. A study on the weekly calendar effect of CSI 500 stock index futures based on asymmetric perspective. China Business Journal, 2021, 16: 42-45.