New Evidence on the Holiday Effect in the Chinese Stock Market

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This paper investigates the holiday effect in the Chinese stock market using the GARCH (1,1) and GARCH (1,1)-M models for the period of January 2006 to February 2017. The findings reveal that most of the broad market indices exhibit the holiday effect. At the industry level, the holiday effect is consistently observed in the Shanghai Stock Exchange, while the results are mixed in the Shenzhen Stock Exchange. The change in the risk premium provides a mixed result in explaining the holiday anomalies, and the holiday effect is dominated by the non-culturally-based holidays, which fall on the turn of the month.

INTRODUCTION

Market efficiency has been a popular topic in finance since the seminal paper by Fama (1970), which introduced the Efficient Market Hypothesis (EMH). Under the weak-form EMH, stock prices reflect all information from historical prices, and no additional value would be created by performing technical analysis. Since market efficiency has important implications for market participants in establishing investment strategies, many studies have dedicated to the testing of market efficiency and the discovery of market seasonalities or anomalies. Among many known market anomalies, the holiday effect, which refers to the persistent high returns on trading days preceding a holiday, is regarded as one of the oldest and most consistent seasonal patterns.

While numerous empirical studies have focused on the holiday effect in the context of western holidays or the developed markets (Lakonishok and Smidt (1988), Liano, Marchand, and Huang (1992), Cadsby and Ratner (1992), Kim and Park (1994), Meneu and Pardo (2004), Chong, Hudson, Keasey, and Kittler (2005), Keef and Roush (2005), Marquering, Nisser, Valla (2006), Marrett and Worthington (2009), and etc.), the developing markets, like the Chinese stock market, with its unique market features and increasingly prominent role in the global financial market, has not received comparable attention. According to a recent report from the World Bank, since the financial crisis of 2008[1], China has become the largest contributor to global economic growth. Since their establishment in 1991, China's two stock exchanges, Shanghai Stock Exchange (SSE) and Shenzhen Stock Exchange (SZSE), have grown at a tremendous pace in terms of number of the companies listed, market capitalization, and shares traded. According to World Federation of Exchanges, by the end of 2014, China's stock market capitalization ranked as the second largest, behind only the U.S. market. Contrary to the previous perceptions about the Chinese market being like a gambling casino, the informativeness of the stock prices in the Chinese stock market has improved (Carptenter, Lu, and Whitelaw, 2015). Meanwhile, the average monthly excess returns on the Chinese market are found to be higher than those in the U.S. Therefore, the market behaviors in the Chinese stock market should be of great interest to global investors.

The purpose of this study is to investigate the holiday effect in the Chinese stock market for the period of January 2006 to February 2017. Specifically, using generalized autoregressive conditional heteroscedasticity (GARCH) models, this study examines the existence of the holiday effect in the broad market and industry indices listed on the Shanghai Stock Exchange (SSE) and the Shenzhen Stock Exchange (SZSE). This paper differs from previous studies in the following three ways. First, it adopts a sample period that covers the period after the non-tradable shares reform of 2005–2006, a turning point for reaching improved price efficiency and quality corporate government. Therefore, whether seasonal regularities still exist is worth investigation. Second, this study evaluates whether the change of the risk premium from investors could explain the high return on pre-holiday trading. The results would provide investors with some insights for developing adequate asset price models. Third, this paper categorizes the holidays into two classes, culturally-based, which follows the schedule on the lunar calendar, and non-culturally-based, which follows the dates on the solar calendar (Gregorian calendar). This difference in the calendar system has created a unique scenario: holidays that follow the solar calendar all fall on the first day of the month, around the same time the turn-of-the-month effect takes place. Therefore, such a classification allows us to understand whether the holiday effect is robust to the classification of the holiday type, and whether the observed holiday effect could be partly attributed to other known calendar effects.

The remainder of the paper is organized as follows. Section 2 reviews the literature on the holiday effect. Section 3 presents the background of the Chinese stock markets. Section 4 describes the data and the empirical models. Section 5 discusses the empirical findings. Section 6 offers the conclusions of the study.

LITERATURE REVIEW

Many of the previous studies on the holiday effect have focused on western holidays in the developed markets, especially the U.S. market. Using 90 years (1897–1986) of daily data on the Dow Jones Industrial Average (DJIA), Lakonishok and Smidt (1988) studied the returns on days before a holiday, after a holiday, and the other regular trading days. They found that the return before holidays was 20 times more than the average return of normal trading days, and argued that such results were unlikely to be chance occurrences or results of data snooping bias. Kim and Park (1994) provided evidence that the holiday effect was persistent across the U.S., the U.K., and the Japanese markets, despite the difference in the institutional designs and the different holidays observed in each market. Hiraki and Maberly (1995) examined the holiday effect in Japan. They found unusually high returns on days preceding holiday closures. However, when they categorized holidays into three groups, they found the holiday effect only existed during the Golden Week period, not on the rest of the holidays. Therefore, they argued that the Japanese holiday effect is not robust to holiday classifications. Meneu and Pardo (2004) studied the holiday effect using five of the most traded stocks from the Spanish Stock Exchange and showed similar pre-holiday rallies that were not related to any calendar anomaly. Using the daily data from January 1973 to July 2003, Chong, Hudson, Keasey, and Littler (2004) examined whether the holiday effect had declined for the U.S., the U.K., and Hong Kong markets. Their results indicated a decline in pre-holiday returns for all three markets, but only the result from the U.S. market is statistically significant. They also discovered a reversal of the holiday effect for the U.S. market during 1991–1997. That is, instead of observing abnormally higher positive returns for days immediate prior to holidays, the pre-holiday return was negative and statistically significant at 1%. They proposed that the reversal was due to a change in investors' trading behaviors. Marrett and Worthington (2009) used the daily stock returns from September 1996 to November 2006 from the Australian market to analyze the holiday effect at the market and industry level as well as for small capitalization stocks. They documented that the Australian market exhibited the pre-holiday effect in the small cap stocks and the retail industry. Chia, Lin, Ong, and Teh (2015) investigated the pre- and post-Chinese New Year holiday effect in the Hong Kong stock market for the period of January 1988 to July 2012. Not only did they find significant pre-holiday effects, they also documented asymmetrical market reactions toward positive and negative news. The post-holiday returns were found to be more volatile than the pre-holiday returns.

Recently, there have been some studies exploring the holiday effect in emerging markets. Dodd and Gakhovich (2011) investigated the holiday effect in 14 emerging Central and Eastern European markets. They documented the holiday effect in several countries in the region and argued that such effect was significant for younger markets and that its importance would diminish over time. Yuan and Gupta (2014) studied the Chinese New Year holiday effect in seven Asian stock markets and found a significant high return before the arrival of the Chinese New Year in these markets. They documented that such seasonal patterns did not necessarily imply market inefficiency. In the case of the Chinese market, it was the increased in the risk premium that caused the abnormal higher returns. Later, Yuan, Gupta, and Bianchi (2015) confirmed that the time-varying risk is usually the cause of the pre-holiday effect in the Chinese market. Seif, Docherty, Shaamsuddin (2017) tested the significance of the holiday effect in nine advanced emerging markets. They found returns were higher on trading days pre- and post-public holidays, and this anomaly can't be explained by the change of the risk. Therefore, they argued that the emerging markets are not as efficient as the developed markets, as had been claimed by Griffin, Kelly, and Nardari (2010). Overall, the holiday effect has been found to be diminished over the years in developed markets. Such anomalies, however, are still significant in the developing markets due to the market being less efficient than developed markets.

BACKGROUND OF CHINESE STOCK MARKET

The Chinese stock market is a young, rapidly-growing market. It is comprised of two stock exchanges, the Shanghai Stock Exchange (SSE) and the Shenzhen Stock Exchange (SZSE), which are under the supervision of the China Securities Regulatory Commission (CSRC). Since established, the market has grown from 14 listed companies (8 on SSE and 6 on SZSE) in December 1991, to 3,185 listed companies (1,247 on SSE and 1,938 on SZSE) in March 2017. The main boards of the SSE and the SZSE list large established companies, whereas the Small and Medium Enterprise (SME) board and the ChiNext board of the SZSE provide alternative platforms for smaller corporations to raise capital. The average annual return on investment (ROI) in both markets was about 25%, and the average annual turnover rate defined by the trading volume over the number of shares circulated was 234.84% for the SSE Composite Index, and 309.98% for the SZSE Composite Index for the period of 1991–2016. As of the end of March 2017, the market capitalization was US $4,418.83 billion for the SSE, and US $3,412.07 billion for the SZSE. In March 2017, the trading volume was 484 billion shares for the SSE, and 402.18 billion shares for the SZSE.[2] Figure 1 illustrates the growth of the number of listed companies, Figure 2 shows the returns on investments, and Figure 3 presents the turnover rates for the SSE and the SZSE over the years.

FIGURE 1
NUMBER OF LISTED COMPANIES, JUL.1991- FEB. 2017

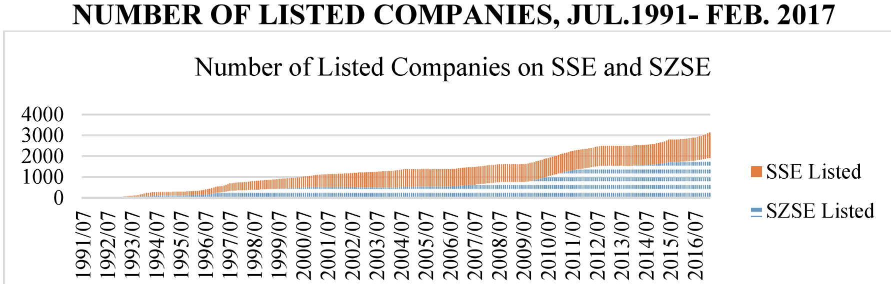


FIGURE 2
ANNUAL RETURNS ON INVESTMENTS, 1992-2016

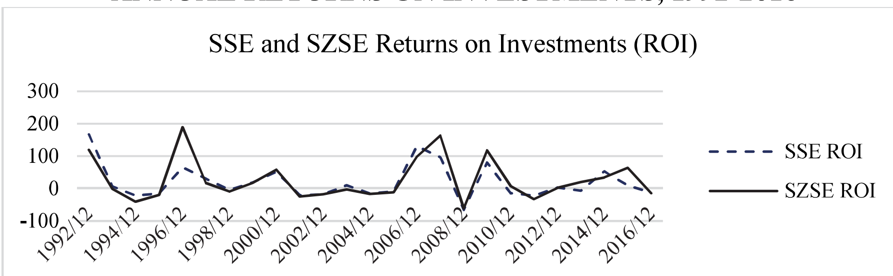
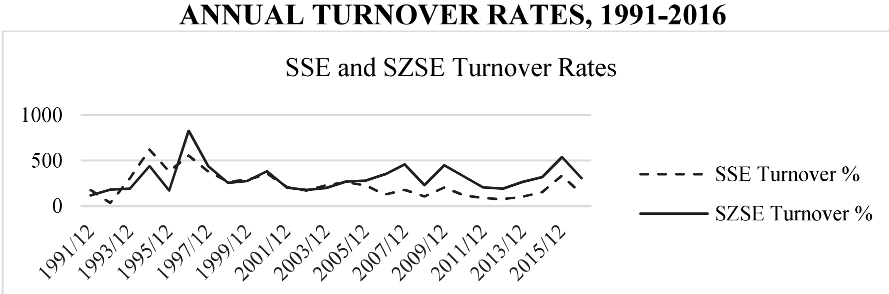
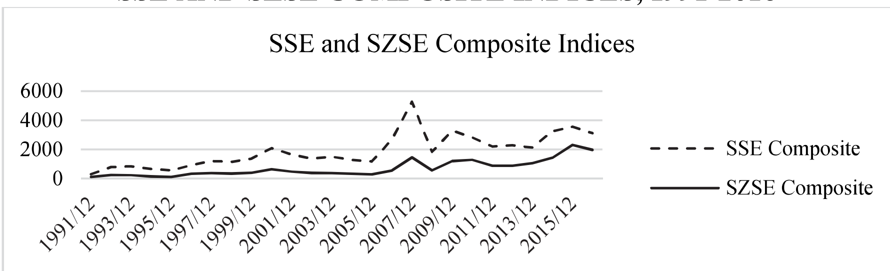


FIGURE 3
ANNUAL TURNOVER RATES, 1991-2016



China's stock market has three distinctive characteristics that make it very different from other developed or developing markets. First, it has a dual-share system, Class A shares and Class B shares. A shares are denominated in the local currency and were only accessible to domestic investors before the end of 2002. B shares, on the other hand, are denominated in foreign currencies (the U.S. Dollar for the SSE B shares and the Hong Kong Dollar for the SZSE B shares) and were opened to foreign investors before early 2001. Subject to regulations and approvals, foreign investors can invest in China's capital market through designated channels such as the Qualified Foreign Institutional Investor (QFII), or the Shanghai/Shenzhen-Hong Kong Stock Connect. Second, the market has a high penetration of retail investors who do not have a comprehensive skill set to perform detailed analysis, as do institutional investors. Unlike developed markets where institutional investors usually play a dominant role in the stock market, the role of institutional investors in the Chinese stock market is negligible (Kling and Gao, 2004). According to Carpenter, Lu, and Whitelaw (2015), more than 80% of the trading has been done by individual investors. Also, capital gains in China are tax free (Gao and Kling, 2005). Therefore, the market atmosphere is highly speculative. Third, the Chinese equity market is a highly regulated environment. The government intervenes in market activities mainly by controlling IPO quotas and approvals, setting price limits, and imposing stamp duties (Sutthisit, Wu, and Yu, 2012). Before 2005, most of the shares issued were the so-called non-tradable shares. Non-tradable shares (NTS) entitled shareholders to identical rights as tradable shareholders except they could not be publically traded, and NTS were owned by state or state-owned enterprises. Since the tradable shareholders had little influence on the corporate decisions made by the non-tradable shareholders, the design of the NTS system created an agency problem (Yeh, Shu, Lee, and Su, 2009) and was long thought to be an obstacle to financial development. During 2005–2006, China launched the Non-Tradable Share Reform, which aimed to eliminate the NTS and further financial privatization in the Chinese capital market. Figure 4 shows that since 2006, the SSE and the SZSE Composite indices have become more active compared to the years before this reform.

FIGURE 4
SSE AND SZSE COMPOSITE INDICES, 1991-2016



DATA AND METHODOLOGY

Data

The daily returns for the SSE and the SZSE indices for the period from January 2006 to February 2017 were obtained from the Taiwan Economic Journal, a leading financial data provider in Asia. There are 2,709 observations for each index, except for three newly comprised indices in the SZSE.[3] The sample period began in 2006, because as many studies have documented, after the Non-Tradable Share Reform in 2005-2006, the price efficiency, liquidity, and the quality of corporate governance of the listed companies had improved, making the investigation of a potential holiday effect meaningful (Guo and Keown, 2009).

In this study, indices at the broad markets and industry levels were analyzed. The broad market indices investigated were the SSE Composite, the SSE A Share, the SSE B Share, the SZSE Composite, the SZSE A Share, and the SZSE B Share. To capture an industry-specific holiday effect, indices at the industry level were also studied. The SSE has five industry indices: Industrial, Commercial, Real Estate, Public Utilities, and Conglomerates. For the SZSE, fifteen industry indices were covered: Agriculture, Mining, Manufacturing, Utilities, Construction, Wholesale & Retail, Transportation, Information Technology, Finance, Real Estate, Business Support, R&D, Environmental Protection, Media, and Conglomerates. Appendix 1 shows the descriptive statistics for the data. Among the twenty six indices analyzed, the R&D index in the SZSE has had the highest average daily return at 0.0866%, while the A share index from the SSE has had the lowest at 0.0379%. The indices from the SZSE, on average, have higher returns and volatilities than those from the SSE. This finding can be explained by the constituents of the two exchanges. The listed companies in the SSE are large mature companies that tend to have relatively stable profits; therefore, the returns are less volatile. For the SZSE, the SME and the ChiNext boards include small young companies that have less predictable revenues and returns. The results from the Jarque-Bera test indicated that none of the indice exhibited normal distribution.

Methodology

To analyze the presence of the holiday effect in the Chinese stock market, this study defined the holidays as the seven major public holidays (holiday periods) celebrated in China. These are New Year's Day, Labor Day, National Day, Chinese Lunar New Year (Spring Festival), Qingming Festival, Dragon Boat Festival, and Mid-Autumn Festival. In our sample period, 75 holidays were captured.

GARCH (1,1)

Developed by Engle (1982), Bollerslev (1986), and many others, the generalized autoregressive conditional heteroscedasticity (GARCH) models are known for their capabilities for explaining many finance stylized facts, such as volatility clustering, fat tails, and mean reversion (Zivot and Wang, 2006). Therefore, the literature has suggested that stock market anomalies are best estimated by the generalized autoregressive conditional heteroscedasticity (GARCH)-type models (Brooks, 2014).

In this paper, the holiday effect was investigated using the GARCH (1,1) model. The specifications of GARCH (1,1) are as follows.

Mean equation: $R_t = \phi Dpre + u_t$ (1)

Variance equation: $\sigma_t^2 = \alpha_0 + \alpha_1 u_{t-1}^2 + \beta_1 \sigma_{t-1}^2$ (2)

The R_t is the daily return and $Dpre$ is the dummy variable. $Dpre$ takes on the value 1 if it is the day before the holiday, and 0 otherwise. ϕ is the coefficient for the holiday dummy variable. The null hypothesis is that $\phi = 0$. If ϕ is positive and statistically different than zero, it shows that higher returns occur on the pre-holiday trading. u_t is an error term and σ_t^2 is the conditional variance. α_0 is the intercept in the variance equation. α_1 and β_1 are the coefficients for the lagged squared error and the lag conditional variance, respectively. According to Brooks (2014), it is typical for the sum of α_1 and β_1 to be close to 1 when the shocks to conditional variance are persistent.

GARCH (1,1)-M

Finance theories suggest that investors should be compensated more for taking additional risk, which is usually measured by the volatility of the return. In this study, in addition to the GARCH (1,1) model, the GARCH(1,1)-M model was adopted to capture whether the observed holiday effect is the result of the change of risks assumed. The specifications of GARCH (1,1)-M are as follows:

Mean equation: $R_t = \delta\sigma_{t-1} + \phi Dpre + u_t$ (3)

Variance equation: $\sigma_t^2 = \alpha_0 + \alpha_1 u_{t-1}^2 + \beta_1 \sigma_{t-1}^2 + \gamma Dpre$ (4)

δ is the coefficient for the risk premium. If δ is positive and statistically significant, it means that an increased risk will result in a rise in the mean return. $Dpre$ is the dummy variable and, it takes on the value 1 if it is the day before the holiday and 0 otherwise. ϕ is the coefficient for the holiday dummy variable. u_t is an error term and σ_t^2 is the conditional variance. α_0 is the intercept in the variance equation. α_1 and β_1 are the coefficients for the lagged squared error and the lag conditional variance, respectively. γ is the coefficient for the dummy $Dpre$ in the variance equation. If γ is statistically significant, it shows that the holiday effect matters to the variance equation and the mean equation.

EMPIRICAL RESULTS

GARCH (1,1) Results

Appendix 2 reports the empirical results of GARCH (1,1) for the broad market indices. According to Appendix 2, except for the SSE B Share, most of the broad market indices revealed the holiday effect with statistical significance during the period investigated. All the estimated dummy coefficients were positive and, in general, higher with the indices from the SZSE than those from the SSE. The strongest holiday effect occurred in the SZSE Composite index, with a coefficient of 0.4758. Such results can be explained by the constituents of the SZSE markets. Prior studies (Vergin and McGinnis, 1999; Keef and Roush, 2005) have suggested that the holiday effect is more significant with smaller firms. The SZSE, which contains many small or medium-sized firms, is prone to have a stronger holiday effect than those in the SSE, which typically is composed of large and mature companies. As expected, the sum of the α_1 and β_1 coefficients was close to 1 across the indices.

Appendix 3 and Appendix 4 present the empirical results of GARCH (1,1) by industry for the SSE and the SZSE, respectively. At the industry level, all five sectors (Industrial, Commercial, Real Estate, Public Utilities, and Conglomerates) in the SSE show evidence of the holiday anomalies. For the SZSE market, only four out of fifteen sectors, Mining, Utility, Wholesale & Retail, and Real Estate, demonstrated the holiday effect. It is interesting to note that the Real Estate sector shows the pre-holiday abnormal returns regardless of the exchange on which it was listed. This may be partly due to the continually rising housing prices in the Chinese market for the past decade. According to Wu, Gyourko, and Deng (2012), since 2003, housing prices have appreciated by at least 10% per year for major cities, making real estate investments speculative and less efficient.

GARCH (1,1)-M Results

To detect whether the aforementioned holiday anomalies from the SSE and the SZSE were caused by the change in the risk premium of the investment, GARCH (1,1)-M model was applied to the indices that showed the holiday effect in the mean equation from Appendix 2 to Appendix 4. Appendix 5 and Appendix 6 report the results for the indices from the SSE and the SZSE, respectively. According to Appendix 5, although all the δ, the coefficient for risk premium, in the mean equations were positive, they were not statistically significant. Meanwhile, the coefficients for the holiday dummy, ϕ, were still statistically significant for the SSE Composite, A Share, Commercial, Real Estate, and Conglomerates. The Real Estate sector in the SSE market specifically, had the highest coefficient for the holiday dummy at 0.5459. Therefore, the holiday effect is persistent, and the change in the risk premium cannot explain the abnormal higher returns prior to the arrival of the holiday. Interestingly, in the SZSE, some of the abnormal higher pre-holiday returns are actually caused by the change of the risk premium in the indices. After adding σ_{t-1} that measures the risk in the mean equation, the holiday effect was no longer statistically significant for the SZSE Composite, the SZSE A Share, and Wholesale & Retail, according to the results shown in Appendix 6. This implies that it is the change of the risk, rather than the timing of the calendar, that results with the high return of the indices for the trading day before the coming of the holiday. The Real Estate sector in the SZSE market, however, showed the persistent holiday anomaly with the holiday dummy coefficient of 0.4837.

In summary, the holiday effect does exist in some of the indices in the SSE and the SZSE market and this holiday anomaly seems to be more common in the SSE market than that in the SZSE market. In the next section, some possible causes will be discussed.

Holiday Anomalies

While there is no consensus as to what actually explains the existence and the persistence of the holiday effect, many have argued that this anomaly may stem from the investor's psychology or holiday euphoria. For example, some investors make impulse purchases prior to the holiday due to a holiday euphoria-induced high spirit (Lahav, Shavit, and Benzion, 2016). Some other explanations include the firm size (Keef and Roush, 2005), change in the risk (Yuan, Gupta, Bianchi, 2015), and limits to arbitrage due to regulations or market segregation (Seif, Docherty, and Shamsuddin, 2017).

A close look at the seven holidays observed in the Chinese stock market revealed that they could be categorized into two groups: culturally-based and non-culturally-based. The four culturally-based holidays, i.e., Chinese Lunar New Year, Qingming Festival, Dragon Boat Festival, and Mid-Autumn Festival, follow the lunar calendar. Therefore, their exact dates converted into the days on the solar calendar will not be the same every year. On the other hand, the non-culturally-based holidays, i.e., New Year's Day, Labor Day, and National Day, are mandated on certain days based on the solar calendar, and they all fall on the first day of the month. This interesting setting prompted us to investigate whether the existing holiday effect discussed earlier can be partly explained by the known turn-of-the-month effect, the seasonal pattern of realizing high returns around the turn of the month. Studies on the turn-of-the-month effect include Ariel (1987), Lakonishok and Smidt (1988), Cadsby and Ratner (1992), Kunkel, Compton, and Beyer (2003), Wong, Agarwal, and Wong (2006), McConnel and Xu (2008), Kayacetin and Lekpek (2016), etc. To study whether the turn-of-the-month effect contributed to the high return found on the pre-holiday trading, the following GARCH (1,1) model has been adopted.

Mean equation: $R_t = \theta Cul\_Dpre + \eta NonCul\_Dpre + u_t$ (5)

Variance equation: $\sigma_t^2 = \alpha_0 + \alpha_1 u_{t-1}^2 + \beta_1 \sigma_{t-1}^2$ (6)

R_t is the daily return, and Cul_Dpre is the dummy variable for the culturally-based holidays. Cul_Dpre takes on the value 1 if it is the day before the culturally-based holiday and 0 otherwise. $NonCul\_Dpre$ is the dummy variable for the non-culturally-based holidays. $NonCul\_Dpre$ takes on the value 1 if it is the day before the non-culturally-based holiday and 0 otherwise. u_t is an error term and σ_t^2 is the conditional variance. α_0 is the intercept in the variance equation. α_1 and β_1 are the coefficients for the lagged squared error and the lag conditional variance, respectively. Appendix 7 through Appendix 9 report the testing results of the above model.

According to Appendix 7, all the coefficients for the non-culturally-based holiday dummies are statistically significant, while none of the coefficients for the culturally-based holiday dummies are significant. Among the six broad market indices, the SZSE B Share had the strongest impact with the arrival of the non-culturally-based holidays with the coefficient 0.8818. Appendix 8 and Appendix 9 report the estimations of the holiday effect with the culturally-based and non-culturally-based holiday dummies at the industry level for the SSE and the SZSE, respectively. As illustrated in Appendix 8, the coefficients for the non-culturally-based holiday dummies are statistically significant, but those from the culturally-based holidays are not. Such results persist across the five industries from the SSE. A similar impact from the non-culturally-based holiday dummies was also found in some of the indices in the SZSE, as documented in Appendix 9. In summary, since all the non-culturally-based holidays also coincide with the days around the turn of the month, the empirical findings suggest that the holiday effect in the Chinese market may partly be explained by the turn-of-the-month effect.

CONCLUSIONS

Despite its short history, the Chinese market has emerged with a leading role in today's global financial market. China's unique institutional arrangements and the strong role that individual investors play in its market make the study of the potential seasonal patterns appealing to international investors. In this study, we examined the presence of the holiday effect in China's two stock exchanges: the Shanghai Stock Exchange and the Shenzhen Stock Exchange. Using the daily return data from January 2006 to February 2017, this paper analyzed whether pre-holiday abnormally high returns exist at both the market and the industry levels. In this study, the holidays referred to the seven major holidays observed in China, and the pre-holiday stands for the trading day immediately before a holiday.

Our results indicate the existence of the holiday effect in the Shanghai Stock Exchange and the Shenzhen Stock Exchange. Specifically, most of the broad market indices exhibited the holiday effect for the period under investigation, and the market indices from the Shenzhen Stock Exchange tended to have a stronger response to the arrival of a holiday than those from the Shanghai Stock Exchange. At the industry level, the holiday effect was consistent and statistically significant in the Shanghai Stock Market. The industry results from the Shenzhen Stock Exchange, however, were mixed. In assessing the potential causes for the holiday anomalies, this study found that (1) the change of the risk premium provided a mixed result in explaining the holiday anomalies, and (2) the holiday effect in the Chinese stock market was dominated by the influence from non-culturally-based holidays, which all fall at the turn of the month. Therefore, the abnormal pre-holiday return may partly be attributed to the turn-of-the-month effect. Future studies may explore whether the recent policy-led integrations of the Shanghai, Shenzhen, and Hong Kong markets improve market efficiency by diminishing the observed holiday effect.

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ENDNOTES

1. http://www.worldbank.org/en/country/china/overview#1
2. The data are retrieved from the Shanghai Stock Exchange, the Shenzhen Stock Exchange, and the Taiwan Economic Journal.
3. Due to data availability, indices for Business Support, R&D, and Environmental Protection from the Shenzhen Stock Exchange were only available starting March 2013.

APPENDICES

APPENDIX 1
DESCRIPTIVE STATISTICS OF THE DAILY RETURNS

Panel A: Shanghai Stock Exchange

	SSE Composite	A Share	B Share	Industrial	Commercial	Real Estate	Public Utilities	Conglomerates
Mean	0.0379	0.0377	0.0637	0.0388	0.0582	0.0707	0.0398	0.0381
Std. Dev.	1.7583	1.7589	2.0631	1.8236	2.0384	2.4518	1.9850	1.8388
JB Test	1865	1860	3273	1584	1189	622	2067	1920
Probability	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Observation	2709	2709	2709	2709	2709	2709	2709	2709

Panel B: Shenzhen Stock Exchange

	SZSE Composite	A Share	B Share	Agriculture	Mining	Manufacturing	Utilities	Construction	Wholesale & Retail
Mean	0.0728	0.0730	0.0653	0.0758	0.0616	0.0755	0.0530	0.0840	0.0800
Std. Dev.	1.9676	1.9757	1.7073	2.2480	2.5717	1.9690	2.1632	2.3415	2.0743
JB Test	1004	992	2233	612	407	1015	1589	801	707
Probability	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Observation	2709	2709	2709	2709	2709	2709	2709	2709	2709
	Transportation	IT	Finance	Real Estate	Media	Conglomerates	Business Support	R&D	EP
Mean	0.0441	0.0767	0.0556	0.0756	0.0840	0.0683	0.0782	0.0866	0.0563
Std. Dev.	2.1361	2.2794	2.6630	2.3850	2.6336	2.2720	1.9969	2.3807	1.9914
JB Test	1581	376	371	518	678	732	230	520	752
Probability	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Observation	2709	2709	2709	2709	2709	2709	966	966	966

Note: The sample period is from January 2006 to February 2017. Numbers are in the percentage format.

APPENDIX 2
GARCH (1, 1) RESULTS FOR THE HOLIDAY EFFECT IN THE SHANGHAI STOCK EXCHANGE AND THE SHENZHEN STOCK EXCHANGE BY BROAD MARKET INDICES

	SSE Composite	**SSE-A**	**SSE- B**		**SZSE Composite**	**SZSE-A**	**SZSE-B**
Mean equation				Mean equation			
ϕ	0.3547 (0.0578)*	0.3542 (0.0581)*	0.3356 (0.1336)	ϕ	0.4758 (0.0612)*	0.4723 (0.0638)*	0.4645 (0.0044)***
Variance equation				Variance equation			
α_0	0.0106 (0.0005)***	0.0107 (0.0005)***	0.1346 (0.0000)***	α_0	0.0329 (0.0000)***	0.0331 (0.0000)***	0.0426 (0.0000)***
α_1	0.0567 (0.0000)***	0.0567 (0.0000)***	0.1477 (0.0000)***	α_1	0.0552 (0.0000)***	0.0553 (0.0000)***	0.0757 (0.0000)***
$\boldsymbol{\beta_1}$	**0.9413 (0.0000)*** **	**0.9412 (0.0000)*** **	**0.8245 (0.0000)*** **	$\boldsymbol{\beta_1}$	**0.9361 (0.0000)*** **	**0.9360 (0.0000)*** **	**0.9104 (0.0000)*** **

Notes: ϕ stands for the coefficient for the holiday dummy, D_{pre}. α_0 is the intercept in the variance equation. α_1 and β_1 are the coefficients for the lagged squared error and the lag conditional variance, respectively. P-values are in the parentheses. ***, **, and * refer to the significance at the 1%, 5%, and 10% levels, respectively.

APPENDIX 3
GARCH (1, 1) RESULTS FOR THE HOLIDAY EFFECT IN THE SHANGHAI STOCK EXCHANGE BY INDUSTRY INDICES

	Industrial	**Commercial**	**Real Estate**	**Public Utilities**	**Conglomerates**
Mean equation					
ϕ	0.3479	0.5348	0.5861	0.3599	0.3212
	(0.0682)*	(0.0095)***	(0.0122)**	(0.0610)*	(0.0716)*
Variance equation					
α_0	0.0146	0.0400	0.0362	0.0158	0.0108
	(0.0001)***	(0.0000)***	(0.0001)***	(0.0000)***	(0.0001)***
α_1	0.0628	0.0551	0.0612	0.0575	0.0576
	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***
$\boldsymbol{\beta_1}$	**0.9343**	**0.9350**	**0.9335**	**0.9394**	**0.9408**
	(0.0000)***	**(0.0000)*****	**(0.0000)*****	**(0.0000)*****	**(0.0000)*****

Notes: ϕ is the coefficient for the holiday dummy, D_{pre}. α_0 is the intercept in the variance equation. α_1 and β_1 are the coefficients for the lagged squared error and the lag conditional variance, respectively. P-values are in the parentheses. ***, **, and * refer to the significance at the 1%, 5%, and 10% levels, respectively.

APPENDIX 4
GARCH (1, 1) RESULTS FOR THE HOLIDAY EFFECT IN THE SHENZHEN STOCK EXCHANGE BY INDUSTRY INDICES

	Agriculture	**Mining**	**Manufacturing**	**Utilities**	**Construction**	**Wholesale & Retail**
Mean equation						
ϕ	0.1681	0.5026	0.4576	0.3753	0.4559	0.4060
	(0.4399)	(0.0674)*	(0.0643)	(0.0825)*	(0.1297)	(0.0652)***
Variance equation						
α_0	0.0410	0.0404	0.0368	0.0286	0.0462	0.0421
	(0.0001)***	(0.0001)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***
α_1	0.0737	0.0513	0.0600	0.0637	0.0617	0.0585
	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***
β_1	0.9194	0.9428	0.9305	0.9305	0.9304	0.9316
	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***

	Transportation	IT	Finance	Real Estate	Business Support	R&D
Mean equation						
ϕ	0.3443	0.4711	0.3368	0.534	0.2782	0.1609
	(0.1832)	(0.1397)	(0.2995)	(0.0485)**	(0.4856)	(0.7337)
Variance equation						
α_0	0.0481	0.0567	0.0328	0.0292	0.0149	0.0426
	(0.0000)***	(0.0000)***	(0.0000)***	(0.0002)***	(0.0248)**	(0.0000)***
α_1	0.0603	0.0550	0.0472	0.0516	0.0365	0.0577
	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***
β_1	0.9284	0.9337	0.9488	0.9437	0.9600	0.9331
	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***

	EP	Media	Conglomerates
Mean equation			
ϕ	0.0708	0.3960	0.3831
	(0.8368)	(0.2044)	(0.1923)

Variance equation			
α_0	0.0233 (0.0027)***	0.0339 (0.0000)***	0.0806 (0.0000)***
α_1	0.0664 (0.0000)***	0.0562 (0.0000)***	0.0640 (0.0000)***
$\boldsymbol{\beta_1}$	**0.9284 (0.0000)*** **	**0.9392 (0.0000)*** **	**0.9202 (0.0000)*** **

Notes: ϕ is the coefficient for the holiday dummy, D_{pre}. α_0 is the intercept in the variance equation. α_1 and β_1 are the coefficients for the lagged squared error and the lag conditional variance, respectively. P-values are in the parentheses. ***, **, and * refer to the significance at the 1%, 5%, and 10% levels, respectively.

APPENDIX 5
GARCH (1, 1)-M RESULTS FOR THE SHANGHAI STOCK EXCHANGE

	SSE Composite	A Share	Industrial	Commercial	Real Estate	Public Utilities	Conglomerates
Mean equation							
δ	0.0176 (0.5411)	0.0248 (0.1741)	0.0251 (0.1712)	0.0262 (0.1763)	0.0227 (0.2395)	0.0169 (0.3641)	0.0212 (0.2689)
ϕ	0.4885 (0.0000)***	0.3260 (0.0867)*	0.3201 (0.1322)	0.4916 (0.0305)**	0.5459 (0.0216)**	0.3366 (0.1091)	0.2901 (0.0812)*
Variance equation							
α_0	2.6855 (0.0000)***	0.0106 (0.0018)***	0.0123 (0.0025)***	0.0366 (0.0000)***	0.0373 (0.0004)***	0.0125 (0.0048)***	0.0123 (0.0000)***
α_1	0.0607 (0.0000)***	0.0572 (0.0000)***	0.0643 (0.0000)***	0.0551 (0.0000)***	0.0617 (0.0000)***	0.0578 (0.0000)***	0.0564 (0.0000)***
β_1	0.5933 (0.0000)***	0.9407 (0.0000)***	0.9317 (0.0000)***	0.9338 (0.0000)***	0.9330 (0.0000)***	0.9389 (0.0000)***	0.9426 (0.0000)***
γ	**-5.8228**** (0.0000)**	**0.0179 (0.8212)**	**0.1818 (0.0000)*** **	**0.2590 (0.0916)* **	**-0.0283 (0.8884)**	**0.1360 (0.1857)**	**-0.1079 (0.1175)**

Notes: Appendix 5 shows the GARCH (1,1)-M results for the indices that showed holiday effects in the Shanghai Stock Exchange in Appendix 2 and Appendix 3. δ is for coefficient for risk premium. ϕ is the coefficient for the holiday dummy, D_{pre}. α_0 is the intercept in the variance equation. α_1 and β_1 are the coefficients for the lagged squared error and the lag conditional variance, respectively. γ is the coefficient for the holiday dummy in the variance equation. P-values are in the parentheses. ***, **, and * refer to the significance at the 1%, 5%, and 10% levels, respectively.

APPENDIX 6
GARCH (1, 1)-M RESULTS FOR THE SHENZHEN STOCK EXCHANGE

	SZSE Composite	A	B	Mining	Utilities	Wholesale & Retail	Real Estate
Mean equation							
δ	0.0413	0.0412	0.0475	0.0170	0.0316	0.0331	0.0277
	(0.0327)**	(0.0330)**	(0.0128)**	(0.3769)	(0.1117)	(0.0895)*	(0.1530)
ϕ	0.4127	0.4090	0.4160	0.4670	0.3246	0.3522	0.4837
	(0.1100)	(0.1144)	(0.0429)**	(0.1579)	(0.1560)	(0.1511)	(0.0663)*
Variance equation							
α_0	0.0335	0.0337	0.0432	0.0250	0.0273	0.0385	0.0322
	(0.0000)***	(0.0000)***	(0.0000)***	(0.0270)**	(0.0000)***	(0.0000)***	(0.0002)***
α_1	0.0556	0.0557	0.0875	0.0524	0.0646	0.0590	0.0515
	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***
β_1	0.9353	0.9352	0.8948	0.9400	0.9290	0.9298	0.9441
	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***
γ	**0.0357**	**0.0380**	**0.4171**	**0.8715**	**0.1407**	**0.3028**	**-0.1483**
	(0.7899)	**(0.7784)**	**(0.0000)*****	**(0.0000)*****	**(0.2907)*****	**(0.0600)****	**(0.4089)**

Notes: Appendix 6 shows GARCH (1, 1)-M results for indices that showed holiday effects in the Shenzhen Stock Exchange in Appendix 2 and Appendix 4. δ is for coefficient for risk premium. ϕ is the coefficient for the holiday dummy, D_{pre}. α_0 is the intercept in the variance equation. α_1 and β_1 are the coefficients for the lagged squared error and the lag conditional variance, respectively. γ is the coefficient for the holiday dummy in the variance equation. P-values are in the parentheses. ***, **, and * refer to the significance at the 1%, 5%, and 10% levels, respectively.

APPENDIX 7
GARCH (1, 1) ESTIMATION IN THE BROAD MARKET INDICES WITH CULTURALLY-BASED AND NON-CULTURALLY-BASED HOLIDAY DUMMIES

	SSE Composite	SSE-A	SSE- B		SZSE Composite	SZSE-A	SZSE-B
Mean equation				Mean equation			
θ	0.2216	0.2212	0.1075	θ	0.3162	0.3140	0.1594
	(0.3751)	(0.3761)	(0.7008)		(0.3731)	(0.3772)	(0.4824)
η	0.5560	0.5548	0.6411	η	0.7115	0.7046	0.8818
	(0.0746)*	(0.0747)*	(0.0502)*		(0.0653)*	(0.0687)*	(0.0014)***
Variance equation				Variance equation			
α_0	0.0106	0.0107	0.1334	α_0	0.0331	0.0333	0.0369
	(0.0005)***	(0.0005)***	(0.0000)***		(0.0000)***	(0.0000)***	(0.0000)***
α_1	0.0565	0.0566	0.1480	α_1	0.0554	0.0555	0.0698
	(0.0000)***	(0.0000)***	(0.0000)***		(0.0000)***	(0.0000)***	(0.0000)***
$\boldsymbol{\beta_1}$	**0.9414**	**0.9414**	**0.8247**	$\boldsymbol{\beta_1}$	**0.9359**	**0.9358**	**0.9179**
	(0.0000)***	**(0.0000)*****	**(0.0000)*****		**(0.0000)*****	**(0.0000)*****	**(0.0000)*****

Notes: θ is the coefficient for the culturally-based holiday dummy, Cul_D_{pre}. η is the coefficient for the non-culturally-based holiday dummy, $NonCul\_D_{pre}$. α_0 is the intercept in the variance equation. α_1 and β_1 are the coefficients for the lagged squared error and the lag conditional variance, respectively. P-values are in the parentheses. ***, **, and * refer to the significance at the 1%, 5%, and 10% levels, respectively.

APPENDIX 8
GARCH (1, 1) ESTIMATION BY INDUSTRY IN THE SHANGHAI STOCK EXCHANGE (SSE) WITH CULTURALLY-BASED AND NON-CULTURALLY-BASED HOLIDAY DUMMIES

	Industrial	Commercial	Real Estate	Public Utilities	Conglomerates
Mean equation					
θ	0.2091	0.4206	0.5173	0.2476	0.2187
	(0.3966)	(0.1430)	(0.1074)	(0.3294)	(0.3678)
η	0.5760	0.7043	0.7356	0.5823	0.4552
	(0.0838)*	(0.0202)**	(0.0338)**	(0.0651)*	(0.0936)*
Variance equation					
α_0	0.0146	0.0400	0.0364	0.0158	0.0107
	(0.0001)***	(0.0000)***	(0.0001)***	(0.0000)***	(0.0001)***
α_1	0.0627	0.0550	0.0611	0.0574	0.0574
	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***
$\boldsymbol{\beta_1}$	**0.9344**	**0.9350**	**0.9335**	**0.9393**	**0.9410**
	(0.0000)***	**(0.0000)*****	**(0.0000)*****	**(0.0000)*****	**(0.0000)*****

Notes: θ is the coefficient for the culturally-based holiday dummy, Cul_D_{pre}. η is the coefficient for the non-culturally-based holiday dummy, $NonCul\_D_{pre}$. α_0 is the intercept in the variance equation. α_1 and β_1 are the coefficients for the lagged squared error and the lag conditional variance, respectively. P-values are in the parentheses. ***, **, and * refer to the significance at the 1%, 5%, and 10% levels, respectively.

APPENDIX 9
GARCH (1, 1) ESTIMATION BY INDUSTRY IN SHENZHEN STOCK EXCHANGE (SZSE) WITH CULTURALLY-BASED AND NON-CULTURALLY-BASED HOLIDAY DUMMIES

	Agriculture	**Mining**	**Manufacturing**	**Utilities**	**Construction**	**Wholesale & Retail**
Mean equation						
θ	0.0484	0.3831	0.3216	0.2787	0.0.3265	0.2765
	(0.8527)	(0.2479)	(0.3551)	(0.3342)	(0.4001)	(0.0.3537)
η	0.4200	0.6187	0.6748	0.5570	0.6761	0.5624
	(0.2731)	(0.2106)	(0.0706)*	(0.0938)*	(0.1544)	(0.0809)*
Variance equation						
α_0	0.0411	0.0403	0.0370	0.0287	0.0462	0.0422
	(0.0001)***	(0.0001)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***
α_1	0.0736	0.0512	0.0601	0.0638	0.0618	0.0585
	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***
β_1	0.9195	0.9430	0.9303	0.9305	0.9303	0.9316
	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***

	Transportation	IT	Finance	Real Estate	Business Support	R&D
Mean equation						
θ	0.2420	0.3177	0.2796	0.2638	-0.0197	-0.0988
	(0.4639)	(0.5309)	(0.5065)	(0.4948)	(0.9773)	(0.8877)
η	0.5248	0.7355	0.4797	0.9413	0.6617	0.5031
	(0.2190)	(0.0813)*	(0.3439)	(0.0218)**	(0.1751)	(0.4760)
Variance equation						
α_0	0.0483	0.0571	0.0327	0.0292	0.0154	0.0432
	(0.0000)***	(0.0000)***	(0.0000)***	(0.0002)***	(0.0235)**	(0.0000)***
α_1	0.0602	0.0550	0.0472	0.0514	0.0367	0.0584
	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***
β_1	0.9285	0.9334	0.9489	0.9439	0.9596	0.9324
	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***

	EP	Media	Conglomerates
Mean equation			
θ	-0.1565	0.1072	0.2579
	(0.7232)	(0.7839)	(0.5519)
η	0.3680	0.8186	0.6183
	(0.5505)	(0.1473)	(0.1266)
Variance equation			
α_0	0.0236	0.0338	0.0809
	(0.0028)***	(0.0000)***	(0.0000)***
α_1	0.0666	0.0560	0.0641
	(0.0000)***	(0.0000)***	(0.0000)***
$\boldsymbol{\beta_1}$	**0.9282**	**0.9393**	**0.9200**
	(0.0000)****	**(0.0000)******	**(0.0000)******

Notes: θ is the coefficient for the culturally-based holiday dummy, Cul_D_{pre}. η is the coefficient for the non-culturally-based holiday dummy, $NonCul\_D_{pre}$. α_0 is the intercept in the variance equation. α_1 and β_1 are the coefficients for the lagged squared error and the lag conditional variance, respectively. P-values are in the parentheses. ***, **, and * refer to the significance at the 1%, 5%, and 10% levels, respectively.