Kasetsart Journal of Social Sciences 41 (2020) 401–406

Kasetsart Journal of Social Sciences

journal homepage: http://kjss.kasetsart.org

Volatility of holiday effects in Thai stock market

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Article Info

Article history:
Received 5 September 2017
Revised 27 June 2018
Accepted 8 August 2018
Available online 1 September 2018

Keywords:
GARCH mode,
holiday effect,
market efficiency,
return,
SET

Abstract

This paper aims to examine the volatility of holiday effects on Thai stock market. The holiday effect is phenomenon in which high returns could be found around the holiday. The event provided new insight about the weak-form efficiency in the market. The SET index were collected five day daily data from the 1st January 1992 until 31st December 2016. The size of the data was 6,523 days. The holiday data were collected from 1992 to 2016. The holidays, announced by the Bank of Thailand, were 317 days along 25 years. This paper tested the holiday effect by using GARCH(1,1) model and EGARCH(1,1) model both of which are considered as appropriate for time series data. The result showed that there are statistically significant positive higher returns rate than normal days in both pre-holiday and post−holiday. Indeed, we found the abnormal positive returns in pre-holiday is higher than post−holiday at the significant level of 1%. Finally, we tested the model fit to data of two methods by using AIC and SIC. From the result it appeared that EGARCH(1,1) is more appropriate than GARCH(1,1).

Introduction

The returns on investment of all stock markets all over the world move by all types of investors, for example funds investors, securities companies, offshore investors, and others. Because of the variety of investors, the stock returns move by many factors including world economy, interest rate, oil prices, and foreign stock market. Internal factors, such as gender, age, careers, personal income, knowledge, and attitudes also affect stock market. However, all factors above are normal behavior, which can be found in all stock markets in the world. A lot of research suggested that investors have more complicated behavior. They can be affected by abnormal factors, for example, day-of-the-week effect, which means investors have different behavior on each trading day. Moreover, in each month investors also have different trading behavior. We can estimate those abnormal behaviors by using statistic and econometric model. The holiday effect is one of the abnormal behaviors in which the returns in stock market is higher or lower than normal returns. Although many studies around the world have tried to explain and prove the holiday effect, the causes of this event are still unclear.

In this paper, we aim to analyze the market reaction in the Stock Exchange of Thailand (SET) which trades in economically-neutral events in single country (Thailand). This alternative approach has an advantage for the single event study. The approach can permit the comparison of the market reaction, which eliminates the relative significance of different psychological bias. Although there are several papers that have studied the anomalies of holiday effect, there are very few papers in Thailand. This research is beneficial for investors who are setting their investment plan.

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Peer review under responsibility of Kasetsart University.

https://doi.org/10.1016/j.kjss.2018.08.001
2452-3151/

The holiday effect is the phenomenon which finds significant higher returns than normal events. The hypothesis is that when the holiday is arriving, the investor mood has changed. Many researches have found that this mood change is always positive.

The financial crisis affected the empirical result as stated by Holden, Thompson, and Ruangrit (2005) looking at Thai stock market returns before, during and after the Asian financial crisis of 1997. They found that before the crisis, the pre-holiday returns were not significant. During the crisis pre-holiday returns became significant at 10% level and at 5% during post-crisis period. Therefore, it is possible that for a period of time there can be a reversal or reappearance of anomalies after significant events, such as a financial crisis. However, financial crisis is a short time effect. This article uses 25 years, which is long enough to report the returns in averages. In addition, we don't have specific reasons to include the financial crisis in the research. We tried to examine data for as long as possible. The SET has been open for 42 years, but unfortunately the holidays, announced by the Bank of Thailand, show information for only 25 years.

Although the existence of abnormal returns in holiday effect around the world could not be explained, many researchers have found such abnormal returns. Many previous studies, which were conducted in different locations and with various instruments, are as follows. Firstly, in Europe, Meneu and Pardo (2004) studied the effect of holiday in big lot transaction and individual investors. He studied the Spanish stock market, the stock market in New York, and the stock market in Frankfurt by collecting data from January 1990 until December 2000. He used dummy variable regression model. The result found abnormal returns in pre-holiday in Spanish stock market, but there was normal returns in Spanish stock which trades in Germany and the US. Gakhovich (2011) used the same methods as Meneu and Pardo (2004) to examine the holiday effect. Furthermore, he added non-parametric test and ordinary regression model to examine the holiday effect in stock market in Central and Eastern Europe (CEE). The result confirmed the abnormal returns which included both pre-holiday effect and post−holiday effect. The ordinary least square (OLS) is popular in a lot of research. For example, Gama and Vieira (2013) studied the holiday effect in 50 companies in Portugal stock market by collecting data from the year 2003−2013. The result found abnormal returns on the day prior to the holiday and around holiday. At the same time, he found the significant lower trading volume around the holiday.

In Eastern Europe and Asia, there were many researches, For instance, Al-Ississ (2015) studied the holy day effect in 10 Islamic countries. He studied abnormal returns during the religious holiday by using Newey and West (1987) heteroskedasticity-autocorrelation-consistent standard errors with twelve legs. The result found abnormally high returns during Ramadan. He concluded that the stock returns and risk is related to religions. However, the research found the negative abnormal returns during Ashoura in Shia countries. Another research in Europe used a different methodology. Casado, Muga, and Santamaria (2013) studied the effect of US holiday in some stock markets in Europe including France (CAC40), Germany (DAX30), EUROSTOXX50, and UK-FTSE100 by using GARCH(1,1) model, which is considered to be a suitable model for examination of time series data. The result found abnormally positive returns in the stock markets when US stock market is a holiday.

In Asia, there were some researchers who examined this phenomenon including, McGuinness (2005) using descriptive statistics to study the effect of US holiday in Hong Kong (Hang Seng Index) from the analysis of stock index in 1990 −2005. The result confirmed US holiday effect in Hong Kong stock market. Moreover, Chia, Lim, Ong, and Teh (2015) used the GARCH model which included GARCH-M, Threshold GARCH-M, Exponential GARCH-M to study the Chinese New Year holiday effect. The result found the preholiday effect on the day before Chinese New Year holiday, but no effect on the second day after Chinese New Year holiday. In Asia, there is research which used the familiar model, such as Yuan and Gupta (2014) who used ARMA (1,1) and GARCH(1,1) to examine Chinese Lunar New Year effect in 8 stock markets in Asia. The result found highly abnormal returns and highly abnormal risk. Furthermore, Yuan, Gupta, and Bianchi (2015) studied the holiday effect in Chinese stock returns by using the GARCH(1,1) and GARCH(1,1)-M. The result found the abnormal returns in industry level, small cap, medium cap, and large cap.

In Thailand, there are only a few researches which study this phenomenon. For examples, Tangjitprom (2010) used the GARCH(1,1), EGARCH(1,1) and GARCH(1,1)-M to examine the pre-holiday effect on SET. The result found the abnormal high returns. However, Holden et al. (2005) gave th a different result. They couldn't find abnormal returns in Thailand by OLS, GARCH, and TARCH. According to the review papers, most of the recent studies used GARCH, EGARCH, TGARCH, GARCH-M, so the researchers made a decision to follow the recent studies.

Theoretical Framework

Efficient Market Hypothesis: EMH

According to Fama (1970), capital market has been classified into three categories as follows. There are previous prices, previous prices with all published data in the market, and previous prices with published data and private information. This theory assumed that those three categories can help people examine the information flow in the market through the three forms of EMH: the weak, the semi-strong, and the strong form respectively. Then, Fama (1998) accepted the anomalies theory in capital market. He said that the market would continue to become efficient, as abnormal behavior would be gradually offset by the influence of arbitrageurs in the market, making price become informational level. In this study the anomalous behavior or anomalies market is called holiday effect. The concept will be discussed in the next session.

Thaler (1999) believes that behavioral finance importance will grow and eventually integrate with conventional finance. Behavioral finance attempts to better understand investor behavior and explain how it affects stock market returns. Investor behavior can be governed by mood which

can determine stock market returns and liquidity. It is possible that investors get a positive mood before long weekends and holidays, which leads to change in trading patterns and in turn leads to change in returns.

Holiday Effect

The holiday effect is the phenomenon which has found higher returns during holidays than normal days. The hypothesis is when the holiday is arriving, the investor mood has been changed. They always change their mood to be positive as many researches ve found. Investor behavior can be governed by mood which can determine stock market returns and liquidity. It is possible that investors get a positive mood before long weekends and holidays, which leads to change in trading patterns and in turn leads to change in returns (Thaler, 1999).

Methodology

The first methodology was the descriptive statistics, which aim to analyze the basic characteristics of daily stock returns. After that, the unit root test using augmented Dickey-Fuller (ADF) test (Dickey & Fuller, 1979; Said & Dickey, 1984) was conducted before the result from GARCH model, which will be discussed in the next session.

For this research, the researcher aims to examine the holiday effect on the Stock Exchange of Thailand. The quantitative analysis was employed. This paper gathered 317 holidays, which were announced by the central bank, Bank of Thailand from the 1st January 1992 until 31st December 2016. The SET index 6,523 days were collected by five day daily index from Datastream from the 1st January 1992 until 31st December 2016. The daily returns were calculated from total stock index. The dividend yield was omitted. This is consistent with Lakonishok and Smidt (1988) who examined Dow Jones Industrial Average, which does not include dividend yield. In addition, additional test show that dividend yield does not affect their findings.

There are various holidays each year. The main holidays are as follows: New Year's Eve and New Year's Day, Makha Bucha Day, Chakri Day, Songkran Festival, National Labor Day, Coronation Day, Visakha Bucha Day, Mid Year's Closing Day, Asarnha Bucha Day, Buddhist Lent Day, H.M. the Queen's Birthday, Chulalongkorn Day, King's (Rama 9) Birthday, Constitution Day.

Normally, stock data is characterized by time varying volatility, in which conditional heteroskedasticity could be captured. To study the anomalies of holiday effect in time series data, the effect of volatility in the returns series must be captured as stated by Engle (1982). He predicted the volatility patterns. Then, he invented autoregressive conditional heteroskedasticity (ARCH) model. The concept of ARCH model is that the volatility in financial market can change when the time has passed. It becomes more volatile during a financial crisis and less volatile during a period in which the market is calm and steady when there is economic growth. For that reason, the simple regression model does not account for this variation in volatility which is exhibited in stock market.

In this research, public holidays were included, but weekend holidays were excluded. Daily prices between two trading days is $[R_t = ln\frac{p_t}{p_{t-1}}]$ while R_t is stock returns, p_t is the stock price for the day, p_{t-1} is the stock price for the previous day. The pre-holiday means one day before the public holiday. The post—holiday means one day after the holiday. For example, if the holiday is Friday, the pre-holiday is Thursday and post—holiday is Monday.

Moreover, Bollerslev (1986) introduced the general model for ARCH called generalized ARCH (GARCH). The GARCH model developed from ARCH model. Another popular extension of GARCH were Exponential GARCH (EGARCH) invented by Nelson (1991). The model explicitly allows for asymmetries in relationship between returns and volatility. An EGARCH model specifies the functional form and stores the parameter value of an exponential generalized autoregressive conditional heteroskedasticity. EGARCH model attempts to address volatility clustering in an innovation process. Volatility clustering occurs when an innovation process does not exhibit significant autocorrelation, but the variance of the process changes with the time. EGARCH model is appropriate when positive and negative shock of equal magnitude might not contribute equally to volatility. The EGARCH conditional variance model includes, past log conditional variance that compose the GARCH component polynomials (P), past standardized innovations that compose the ARCH and leverage component polynomials (Q).

The constant of regression equation shows the returns of non-pre-holidays or non-post-holidays, while the coefficient of dummy variable is return on normal days R_t plus the calculation from dummy variable. The analysis of time series data is the analysis of data in period of time. The stock returns also appear as a log different in daily prices between two trading days as:

$$R_t = \ln\left(\frac{p_t}{p_{t-1}}\right)$$

where R_t is the stock returns, p_t is the closing price of the SET index at day t, and p_{t-1} is the closing price of the SET index at day t-1. The following regression is estimated to test the holiday effect.

$$R_t = \beta_0 + \beta_1 D + \varepsilon_t$$

The modified variance equation of GARCH(1,1) would be as:

$$h_t = \omega + \alpha\varepsilon_{t-1}^2 + \beta h_{t-1} + \delta_1 D$$

where R_t is a daily returns.

D is a dummy variable for pre-holiday or post—holiday.

β_0 is the averages returns of non-preholiday.

β_1 is the difference between preholiday and non-preholiday returns.

ε_t is a white noise error term.

The exponential GARCH or EGARCH were expected to improve the GARCH(1,1) model by allowing asymmetric response of the conditional variance to the returns movements (Tangjitprom, 2010). The model employed by Kiymaz and Berument (2003) was to avoid the serial

Table 1
Descriptive statistics for SET returns during 1992–2016

Descriptive Statistic for R_t	
Mean	0.0001
Median	0.0000
Maximum	0.1135
Minimum	−0.1606
Standard Deviation	0.0151
Skewness	0.0165
Kurtosis	10.9054

correlation problem. The modified variance of EGARCH(1,1) would be:

$$\ln(h_t) = \omega + \alpha\left|\frac{\varepsilon_{t-1}}{\sqrt{h_{t-1}}}\right| + \gamma\frac{\varepsilon_{t-1}}{\sqrt{h_{t-1}}} + \beta\ln(h_{t-1}) + \delta_1 D_1$$

Based on these instrument and data analysis the next paragraph will show the result from the data analysis of pre and post–holiday effect using GARCH(1,1) and EGARCH(1,1) model. The data were analyzed by GARCH model in EViews program by using dummy variable *Dpre*, and *Dpost*. The dummy variable is equal to 1 when the trading day is the day before holiday (*Dpre*) and the day after holiday (*Dpost*). The dummy variable is equal to 0 when the trading day is the normal trading day.

Results

Descriptive Statistics

Before the result is discussed, the statistics analysis was conducted to describe the characteristic of SET returns during 1992 until 2016. Descriptive statistics are shown as in Table 1.

Table 1 and Figure 1 summarized the descriptive statistics for the SET daily returns for each day. According to Table 1, we can remark as follows. The average returns is 0.01%, the median which shows the center of all data is 0.0000, maximum daily returns is 11.35 percent, minimum daily returns is −16.06 percent, the standard deviation is 0.0151, Skewness is equal to 0.0165, and Kurtosis is equal to 10.9054.

Unit Root Test

The result of ADF test is presented in Table 2. From this table, by using the critical value from MacKinnon (1996), we can reject the null hypothesis of non-stationary of the SET returns. Then, we can conclude that the SET data are stationary during 1992 until 2016. The unit root test is to test the stationary of time series data by null assumption of non-stationary. The ADF test at 1st different level was conducted, with the results as follows.

The study used the GARCH(1,1) and EGARCH(1,1) model to examine the pre-holiday effect in the SET. For the equation R_t is the daily index returns for the period of time *t*, *Dpre* is the pre-holiday dummy variable, *Dpost* is the post −holiday dummy variable, while α and β represent the coefficient of GARCH and ARCH terms respectively.

The result report of two models which captured pre-holiday effect on stock returns and volatility were as follows in Table 3. The constant of pre-holiday effect in GARCH(1,1) model shows that the returns on pre-holiday are 0.0006. The coefficient of the dummy variable, which represented the difference in average returns between pre-holiday and non-holiday is 0.23 percent, significantly higher than non-preholiday returns. The coefficient of the ordinary day returns is represented as R_{t-1} is 0.0860. The variance of examination is shown as follows. The variance which could evaluate the risk on the returns included constant 0.0000, α equal to 0.9997 positive, and β is 0.8816. The Akaike info Criterion (AIC) and Schwarz criterion (SIC) are the indicators which evaluate the suitability of the model. The meaning is more negative of AIC and SIC means the model or instrument is more suitable. The AIC and SIC of GARCH(1,1) for evaluation of pre-holiday effect was −5.8220 and −5.8147 respectively.

The results from EGARCH model are also presented in Table 3 as follows. The constant of EGARCH(1,1) model shows that the returns on pre-holiday are 0.0005. The coefficient of the dummy variable, which represented the difference in average returns between pre-holiday and non-holiday is 0.24 percent, significantly higher than non-preholiday returns. The coefficient of the ordinary day returns, which is represented as $R_{t-1,}$ is 0.0906. The variance of examination is shown as follows. The variance, which

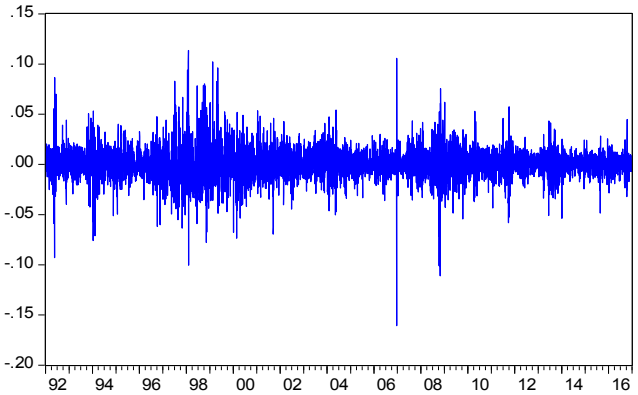

Figure 1 Daily returns of the SET during 1992–2016

Table 2
Unit root test for the SET data from 1996 to 2016

ADF test	
No intercept and trend	−75.15567***
Critical values 1% level	−2.565317
With intercept only	−75.15806***
Critical values 1% level	−3.431174
With intercept and trend	−75.16230***
Critical values 1% level	−3.959444

Note: *** indicated a significant level at .01

Table 3
Pre-holiday returns estimated from GARCH model

Variable	GARCH(1,1)	EGARCH(1,1)
Mean Equation		
Constant	0.0006***	0.0005***
Dpre	0.0023***	0.0024***
R_{t-1}	0.0860***	0.0906***
Variance Equation		
Constant	0.00000377***	−0.4129***
α	0.0997***	0.2022***
β	0.8816***	−0.0518***
γ		0.9705***
Dpre	0.0002***	0.1835***
AIC	−5.8220	−5.8279
SIC	−5.8147	−5.8196

Note: *** indicated a significant level at .01

could evaluate the risk on the returns, included the coefficient in variance −0.4129, α equal to 0.2022, and β is −0.0518. The coefficient of asymmetric term of EGARCH (γ) is 0.9705, which is significant level at .01. The AIC and SIC of EGARCH(1,1) for evaluation of pre-holiday effect was −5.8279 and −5.8196 respectively.

The report of the result of two models capturing post−holiday effect on returns and volatility were as follows in Table 4. The constant of post−holiday effect in GARCH(1,1) model shows that the returns on pre-holiday are positive at 0.0006. The coefficient of the dummy variable, which represented the difference in average returns between post−holiday and non-holiday is 0.14 percent significantly higher than non post−holiday returns. The coefficient of the ordinary day returns, which is represented as $R_{t-1,}$ is 0.0871. The variance of returns included constant 0.0000, α equal to 0.1062, and β is 0.8706. The AIC and SIC are the indicators which evaluate how suitable the model is. The meaning is more negative of AIC and SIC means the model or instrument is more suitable. The AIC and SIC of GARCH(1,1) for evaluation of post−holiday effect was −5.8197 and −5.8134 respectively.

Table 4
Post-holiday returns estimated from GARCH model

Variable	GARCH(1,1)	EGARCH(1,1)
Mean Equation		
Constant	0.0006***	0.0006***
Dpost	0.0014***	0.0016***
R_{t-1}	0.0871***	0.0841***
Variance Equation		
Constant	0.00000588***	−0.4310***
α	0.1062***	0.2041***
β	0.8706***	−0.0536***
γ		0.9675***
AIC	−5.8197	−5.8244
SIC	−5.8134	−5.8172

Notes *** indicated a significant level at .01

The results from EGARCH model are also presented in Table 4 as follows. The constant of EGARCH(1,1) model shows that the returns on post−holiday are positive at 0.0006. The coefficient of the dummy variable, which represented the difference in average returns between post−holiday and non-holiday, is 0.16 percent, significantly higher than non-post-holiday returns. The coefficient of the ordinary day returns, which is represented as $R_{t-1,}$ is 0.0841. The coefficient of asymmetric term of EGARCH (γ) is 0.9675, which is significant level at .01. The variance of returns included constant −0.4310, α equal to 0.2041 positive, and β is −0.0536. The AIC and SIC of EGARCH(1,1) for evaluation of post−holiday effect was −5.8244 and −5.8172 respectively.

Concluding Remarks

Seasonal patterns in stock market are well documented in literature around the world. Most of the papers showed that the anomalies can be predicted in terms of certain days, month, or during holiday of the year. All of these anomalies can be called “calendar effect”. The empirical finding of seasonal effect in stock returns seems to challenge the classic theory of EMH which explained that the stock price would be random. Therefore, if any of the calendar effect exists in the market, investors in the market might take excess returns due to adaptation of trading strategies based on these patterns. That is why studying the seasonal effect in stock returns is important both in theory and practice.

The major findings can be summarized showing that significantly pre-holiday and post-holiday positive returns have been found in the SET. In the SET, the abnormal returns in pre-holiday are higher than post-holiday. Secondly, the variance of the abnormal returns move the same way as the returns. The reason why the day before and after holiday gain more returns are still unclear, but we suggested that these inventors tend to be more concerned with short term returns and ignore long-term returns gains or long-term objectives.

This research investigated pre and post−holiday effect in the SET which used weight-value index. The result found that overall stock returns before holiday and after holiday is abnormally higher than normal trading days. From the result of the test, this research is consistent with the researches which examined holiday effect around the world. The difference was most of researches in the literature reviews used OLS and basic statistics to evaluate the holiday effect, only few papers used the GARCH, which is considered to be more effective model to evaluate time series data. This is also consistent with Tangjitprom (2010), who studied the pre-holiday effect and volatility of stock returns in the SET. However, he did not study the post-holiday effect in the SET, so this research confirmed his study and examined further to the post-holiday effect.

The extra returns is quite more efficient to the traders to gain more returns. However, the returns from both pre-holiday and post-holiday are quite small when compared to the transaction cost with at least 0.15% for general

investors. However, traders who are exempted from transaction cost may get benefits from these findings.

Further research could study “pre” or “post” holiday period as this research focus is pre-holiday or post-holiday for 1 day before and after holidays, so it doesn't cover specific issue, such as (5 days, 3 days, and 1 day). This could be further research or research restriction. The holidays which we collected was 317 days. Therefore, each holiday had 317 pre-holiday and 317 post-holiday. The empirical result of 3 or 5 days before and after holiday could be studied in further research because this research uncovered the range of pre- and post-holiday not more than one day. Another suggestion is to focus on stock characteristics and see how they respond around holiday period or specifically on the holiday, such as Royal holidays or religious holidays.

Conflict of interest

None.

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