

THE TEST OF DAY OF THE WEEK EFFECT AND TURN-OF-MONTH EFFECT BY USING A GARCH APPROACH: EVIDENCE FROM INDONESIA CAPITAL MARKET

Hersugondo, Hersugondo^{1,2}, Robiyanto, Robiyanto³
Sugeng Wahyudi⁴ and Irene Rini D. P.⁵

***Abstract:** Seasonality or Calendar Anomalies is interesting topic in capital market. A lot of studies have been documented that seasonality still exist in capital market through time. The most prominent seasonality are Day of the Week Effect and Turn-of-Month-Effect. Some researchers have already studied Day of the Week Effect in Indonesia Stock Exchange with various conclusions but none had studied Turn-of-Month-Effect in Indonesia Stock Exchange. Moreover, most researchers tend to use limited period in their study and abandon the heteroscedasticity in return data. Since limited period of study can produce a misleading conclusion, so Wiley and Zumpano (2009) suggested that researchers must use broad range of data to avoid this mistake. Based on that fact, so this study scrutinized Day of the Week Effect and Turn-of-Month-Effect in Indonesia Stock Exchange by using a long research period. This study used daily return of Jakarta Composite Index (JCI) during 1 July 1997 – 3 June 2014. By applying GARCH (1,1), the finding showed that there were Day of the Week Effect and Turn-of-Month-Effect in Indonesia Stock Exchange. All trading days had a significant impact on JCI return. Monday had negative and significant effects on JCI return, meanwhile other trading days had positive and significant effects on JCI return with Friday's as the highest. Days during Turn of Month had positive and significant impacts on JCI return. This findings might have an implication to investors' trading strategy.*

Keywords: Seasonality, Day of the Week Effect, Turn-of-Month-Effect (TOME).

¹ Ph.D. Student Diponegoro Univ., Fac of Economics and Business Depart. of Financial Management, Semarang, Indonesia.

² Lecturer in Faculty of Economics and Business, Stikubank University, Semarang, Indonesia.

³ Ph.D and Lecturer in Faculty of Economics and Business, Satya Wacana Christian University, Salatiga, Indonesia.

⁴ Prof. in Diponegoro University., Fac of Economics and Business, Depart. of Financial Management, Semarang, Indonesia.

⁵ Ph.D.and Assistant Prof. in Diponegoro University, Fac of Economics and Business, Depart. of Financial Management. Semarang, Indonesia.

CP: hersugondo@unisbank.ac.id; gondarum65@gmail.com; robiyanto76@gmail.com

1. INTRODUCTION

Seasonality or calendar anomaly in stock market is very attractive to many researchers, both abroad and in Indonesia. This phenomenon has produced various effects, not only the effects of trading days (Day of the Week Effect and Monday Effect) which have been investigated by Altiza (2007); Brockman and Michayluk (1998); Brooks (1997); Cahyaningdyah and Witiastuti (2010); Coutts and Sheikh (2002); Dickinson and Peterson (1995); Iramani and Mahdi (2006); Kristiawan (2010); Lakonishok and Maberly (1990); Lutfiaji and Djazuli (2012); Rita (2009); Widodo (2008) but also the effects of superstitious things like the Friday the 13th Effect (Coutts, 1999; Lucey, 2000, 2001). This seasonal phenomenon has also become one of the evidence that capital markets tend to be inefficient (weak) and the evidence that behavioral aspects also play a role in investors' decision-making process.

A number of studies on stock market calendar anomalies have been conducted in Indonesia, especially those examining the effects of trading days (Day of the Week Effect). Such studies are frequently performed by using analytical tools that are less appropriate for the nature of daily stock market return. This can result in differences in the results. The Ordinary Least Square (OLS) is an analytical technique that is often used in researches on the calendar anomalies Indonesian stock market (e.g. Ambarwati (2009); Cahyaningdyah and Witiastuti (2010); Kristiawan (2010)), where as this technique assumes that the used data should be normally distributed and has no heteroscedasticity.

Corhay and Rad (1994) suggested that the daily stock market returns tend to be abnormal and have heteroscedasticity. This is also reinforced by Kamath, Chakornpipat, and Chatrath (1998) who found that stock market returns in Thailand are abnormally distributed and have heteroscedasticity. In addition, Robiyanto (2000) also found that the whole stock price index returns at the Jakarta Stock Exchange are not normally distributed. An analysis tool that can accommodate the behavior of such data is GARCH (Generalized Conditional Autoregression Heteroscedasticity) which was introduced by Bollerslev (1986). Therefore, this study used GARCH in analyzing the data. This study also examined the Turn-of-Month Effects since studies on this issue are rarely found in Indonesia, although many overseas researches have proved the existence of this phenomenon, such as McGuinness (2006); Nikkinen, Sahlstrom, and Aijo (2007); Zwergel (2010).

This study took a long period, starting from July 1, 1997 until June 3, 2014. This is in contrast to studies done in Indonesia Stock Exchange that generally used a shorter period (than that of this study). A long period taken in this study was based on Wiley and Zumpano (2009) study which suggested that studies on capital market anomalies should use a very wide range of data.

2. THEORETICAL BACKGROUND AND HYPOTHESIS DEVELOPMENT

One of the main hypotheses in the field of modern finance is Efficient Capital Market. Fama (1970) suggested that efficient capital market is a capital market with stock prices

which always reflect all available information quickly. There are three forms of testing the capital market efficiency, including (1) weak-form efficiency where its capital market is said to be efficient if its stock price movement cannot be predicted (random walk), (2) semi-strong efficiency where its capital market is said to be efficient if the stock price reflects all available information for public, and strong-form efficiency where capital market is said to be efficient if the stock price reflects all available information.

Various studies of capital market efficiency, especially which assessed the weak-form efficiency, have found certain things which are contrary to the concept of efficient capital market, such as seasonal particular patterns which do not indicate the result of a reaction to the existing information. When stock market reacts to things that are not included in the concept of efficient market then this phenomenon is referred to as anomaly or disturbance (Fitriyani & Sari, 2013). Anomalies that often occur in the capital market are in the forms of Day of the Week Effect and Turn-of-Month-Effect

Day of the Week Effect is an anomaly in which the trading day differences have an influence on the pattern of stock returns in one week. One of the major phenomena in the Day of the Week Effect is Monday Effect which is an empirical regularity in which the return of a stock tends to be lower on Monday when compared with other days. According to Lakonishok and Maberly (1990), such a phenomenon might happen because of the investors' tendency to sell high on Monday compared to the tendency to make a purchase.

The phenomenon of Turn-of-Month-Effect has been found in many capital markets (Martikainen, Perttunen, & Puttonen, 1995). A study which pioneered the studies of Turn-of-Month-Effect was that conducted by Ariel (1987). He found that stock returns in half of the first month tend to be higher than half of the next month. Moreover, half of the next month is said to be likely to produce negative stock returns. Nikkinen et al. (2007) suggested that the Turn-of-Month-effect could occur due to the announcement of macro-economic data earlier in the month. Different findings were stated by Ogden (1990) who conducted further study on the Turn-of-Month-Effect. Ogden's study (Ogden 1990) is not only to give an explanation, but also to test the validity of Turn-of-Month-Effect. He concluded that the Turn-of-the-Month Effect in the United States may occur because of the country's standard payment system which makes payments on salaries, dividends and others at the beginning of the month and this encourages investment activities in the beginning of the month. Meanwhile, Sias and Starks (1995) suggested that the policy of pension funds to purchase the shares at the beginning of the month as its portfolio strategy has an impact on stock returns at the beginning of the month.

The investors' liquidity needs may change from day to day of the trading week. This condition leads the activities of buying and selling a stock to change every day according to the demand for money. Since the investors' wants and needs tend to change throughout the day, the stock market is also changing both in price and traded quantity. The liquidity-need hypothesis states that individual investors prefer to

estimate their needs for liquidity on the weekend and put a sell order at the beginning of the week. Moreover, information processing hypothesis states that individual investors tend to make their policy portfolio balance on the weekend, but this depends on the occurring conditions (Brockman & Michayluk, 1998). This explanation shows that individual investors play a role in influencing the behavior of daily stock price. But in fact, institutional investors also play a role in influencing the behavior of stock price. This is evidenced by (Sias and Starks 1995) which found that stocks with high institutional ownership tend to experience higher seasonal behavior than stocks with low institutional ownership.

Based on the above description, in general it can be concluded that investor behavior on the everyday trading tend to be different and this may affect the behavior of stock return. Various studies have found that trade is able to affect stock returns, such as researches by Brockman and Michayluk (1998); Cahyaningdyah and Witiastuti (2010); Iramani and Mahdi (2006); Pearce (1996); Rita (2009); Robiyanto (2000); Sias and Starks (1995). Therefore, this study formulates the following hypothesis:

H1. *Trading day has an influence on stock returns*

The Turn of the Month is days which are expected to influence the behavior of stock returns due to macro economic data released at the beginning of the month (Nikkinen *et al.*, 2007) and the existence of payment system making the payment of salaries, dues and others at the beginning of the month (Ogden, 1990), as well as the purchase of shares because of policy of investment from pension funds at the beginning of the month (Ariel, 1987). Empirical evidence shows that the Turn of Month has an impact on stock returns, such as researches by Ariel (1987); Martikainen *et al.* (1995); McGuinness (2006); McGuinness and Harris (2011); Nikkinen *et al.* (2007); Ogden (1990); Zwergel (2010). Therefore, the hypothesis is formulated as follows:

H2. *Turn of the Month has an influence on stock returns.*

3. METHODOLOGY

3.1. Data

The data used in this study was the daily closing *Indeks Harga Saham Gabungan* (IHSG, also called Jakarta Composite Index, JCI) in Indonesia Stock Exchange during the period of July 1, 1997 to June 3, 2014. This data was used to calculate the daily JCI return using by the formula: $Return\ JCI_t = (JCI_t - JCI_{t-1}) / JCI_{t-1}$. The data was obtained from Yahoo Finance.

3.2. Methods of analysis

Data analysis was conducted by using Generalized Autoregressive Conditional Heteroskedasticity (GARCH) which was introduced by Bollerslev (1986). GARCH model used in this study was the GARCH (1,1). To test the impact of trading days on the stock market return, the following model was applied:

$$\text{Return CSPI}_t = \beta_1 \text{MONDAY} + \beta_2 \text{TUESDAY} + \beta_3 \text{WEDNESDAY} + \beta_4 \text{THURSDAY} + \beta_5 \text{FRIDAY} + \varepsilon_t$$

with:

$$\varepsilon_t \varepsilon_t = \Phi_{t-1} + \dots + \Phi_t \varepsilon_{t-p} + \eta_t$$

$$\eta_t = \sigma_t \varepsilon_t$$

$$\sigma_t^2 = \alpha_0 + \alpha_1 \eta_{2t-1} + \dots + \alpha_p \eta_{2t-p} + \beta_1 \sigma_{2t-1}^2 + \dots + \beta_q \sigma_{2t-q}^2$$

and ε_t is independent and identical distributed $N(0,1)$ and does not depend on the past state of η_{t-p} .

*Return CSPI*_t = CSPI daily return

MONDAY = MONDAY dummy variable, 1 if it is MONDAY and 0 if it is not

TUESDAY = TUESDAY dummy variable, 1 if it is TUESDAY and 0 if it is not

WEDNESDAY = WEDNESDAY dummy variable, 1 if it is WEDNESDAY and 0 if it is not

THURSDAY = THURSDAY dummy variable, 1 if it is THURSDAY and 0 if it is not

FRIDAY = FRIDAY dummy variable, 1 if it is FRIDAY and 0 if it is not

To test the impact of Turn of Month (TOM) trading days on stock market return, the following model was applied:

$$\text{Return CSPI}_t = \beta_6 \text{TOM} + \varepsilon_t$$

with:

$$\varepsilon_t \varepsilon_t = \Phi_{t-1} + \dots + \Phi_t \varepsilon_{t-p} + \eta_t$$

$$\eta_t = \sigma_t \varepsilon_t$$

$$\sigma_t^2 = \alpha_0 + \alpha_1 \eta_{2t-1} + \dots + \alpha_p \eta_{2t-p} + \beta_1 \sigma_{2t-1}^2 + \dots + \beta_q \sigma_{2t-q}^2$$

and ε_t is independent and identical distributed $N(0,1)$ and it is independent of the past state of η_{t-p} .

*CSPI*_t Return = Daily CSPI return

TOM = Turn of Month dummy variable, 1 if it is the first trading day up to the third trading day at the beginning of the month and 0 if it is not

TOM = *Dummy variable* of days of month transition, 1 if it is the first trading day until the third trading day at the beginning of the month and 0 if it is not

4. RESULTS

4.1. The Descriptive Statistics of JCI Return

The descriptive statistics of JCI return based on trading days can be seen in Table 1. Based on the Table 1, it can be seen that Monday has the highest maximum value of JCI return when compared to other days. In contrast, Thursday has the lowest minimum value of JCI return when compared to other days. In addition, based on the average value, Friday is a day with the highest average value of JCI return when compared to other days, while Monday is a day with the lowest average value of JCI return and the only day that has an average value of return JCI with a negative sign. Furthermore, based on the standard deviation, Monday is the day with the highest standard deviation value of JCI return, indicating that the risk of share transactions on Monday is higher than other days.

Table 1
Descriptive Statistics of JCI Return Based on Trading Days

	<i>Monday</i>	<i>Tuesday</i>	<i>Wednesday</i>	<i>Thursday</i>	<i>Friday</i>
Maximun	0.140285	0.121771	0.079215	0.084082	0.112836
Mininum	-0.10357	-0.08874	-0.10375	-0.11955	-0.07639
Average	-0.00137	0.000567	0.001122	0.000939	0.001807
Standard Deviation	0.018595	0.016313	0.016818	0.017257	0.016518

Source: Yahoo Finance, processed.

The descriptive statistics of JCI return based on the turn-of-month days can be seen in Table 2.

Table 2
Descriptive Statistics of JCI Return Based on Days of Month Transition

	<i>TOM</i>	<i>Non TOM</i>
Maximun	0.1402848	0.1217708
Mininum	-0.103753	-0.119546
Average	0.0012235	0.0005072
Standard Deviation	0.0182124	0.0169508

Source: Yahoo Finance, processed.

Based on Table 2, it can be seen that JCI return on the turn-of-month days has higher maximum value of JCI return than that on days outside the turn-of-month days, but different results are found on the minimum value of JCI return. On the turn-of-month days, the minimum value of JCI return is lower than that on days outside the turn-of-month.

The average value of JCI return on the turn-of-month days is higher than the average value of JCI return on days outside the turn-of-month, but risks on the turn-of-month days are greater than the risks on the days outside the turn-of-month. This can be seen from table 3.

Table 3
Result of Unit Root Testing

Description	t-Statistics	Probability	Conclusion
Return	-55,70965	0,000	Stationary

Source: Yahoo Finance, processed.

Table 4
The results of the Day of the Week Effect Testing

Day	Coefficient	Z Statistics	Probability
Monday	-0,001027	-2,531315	0,0114
Tuesday	0,001157	2,636504	0,0084
Wednesday	0,002182	5,285159	0,0000
Thursday	0,000898	2,156100	0,0311
Friday	0,002409	5,951737	0,0000
<i>Variance Equation</i>			
C	6.30E-06	9,661144	0,0000
RESID(-1)^2	0.139437	18,00397	0,0000
GARCH(-1)	0.846805	119,1339	0,0000

Source: Yahoo Finance, processed.

Based on Table 4, it can be seen that all trading days have significant influence on JCI return in Indonesia Stock Exchange. Therefore, H1 which states that trading days have no effect on stock returns is accepted. However, Monday is the only day that has a negative impact on JCI returns in Indonesia Stock Exchange, while Friday is a day that has the most positive impact on JCI return in Indonesia Stock Exchange. This study results support the results of foreign researches on the Day of the Week Effect which used a long data period such as those done by Sias and Starks (1995) which took data from 1977 to 1991, Pearce (1996) which used data from 1972 to 1994, and Brockman and Michayluk (1998) which used data from 1963 to 1993. Nevertheless, this study results are not consistent with those on the Day of the Week Effect conducted in Indonesia Stock Exchange which used the relatively short data period, for example Rita (2009), which used a data period from January 2008 - December 2009, found that Wednesday is the day with greatest daily JCI return.

Of the average return value, the results of this study found that the average JCI return on Friday has the highest average return compared to other days. This is different from the research Ambarwati (Ambarwati 2009) which found that the average return on Wednesday is the highest compared to that on other days, but the influence of the trading days in this study is consistent with her research which found that Monday has a negative effect on returns and Friday has a positive effect on return.

The findings in this study indicated that all trading days had a significant impact on JCI return in which Monday had a negative impact and Friday had the biggest positive impact. So, in general this study results are also inconsistent with the results of study by Robiyanto (Robiyanto 2000) who found that only Thursday which has significant impact on JCI return. In general, differences in these results occur because

the previous studies using a very short data period with only one to two years of observation.

4.2. The Turn-of-Month Effect (TOME) Test

The results of Turn-of-Month-Effect test by using GARCH (1,1) can be seen in Table 5.

Table 5
The Results of Turn-of-Month-Effect Test

<i>Description</i>	<i>Coefficient</i>	<i>Z Statistics</i>	<i>Probability</i>
TOME	0,001819	3,805761	0,0001
Variance Equation			
C	6,10E-06	9,587319	0,0000
RESID(-1) ²	0,129124	18,07433	0,0000
GARCH(-1)	0,856548	127,4993	0,0000

Source: Yahoo Finance, processed.

Based on Table 5, it can be seen that the turn-of-month days have a significant positive impact on JCI return. Therefore, H2 stating that turn-of-month days have an influence on stock returns is accepted. This is consistent with studies conducted abroad such as Martikainen *et al.* (1995) who conducted a research on capital markets in Finland, McGuinness (2006) who conducted a research on capital markets in Hong Kong, and Nikkinen *et al.* (2007) who conducted a study on the S & P 100 index.

In general, the payment system in Indonesia is similar to the United States. Ogden (1990) suggested that the standard payment system in the United States makes the payment of salaries, dividend and others at the beginning of the month and it is able to encourage investment activities in the beginning of the month. In Indonesia, the same thing also applies primarily to the payment of salaries and dues associated with investment (e.g. insurance companies, pension funds, and others). At the beginning of the month, after the payment of premiums holders, investment managers perform an investment strategy commonly referred to as dollar cost averaging which is purchasing shares every month to add their portfolio. Empirically, Ariel (1987) suggested that the systematical purchase of pension fund shares at the beginning of the month contributes to the Turn-of-Month Effect. The same strategy is also done by individual investors who have more liquidity in the early months after the salary receipt.

5. CONCLUSION

This study found that all trading days had a significant impact on stock returns in Indonesia Stock Exchange. Monday's influence is negative, while other days have positive influence in which Friday has the highest positive effect. In general, this study is consistent with similar studies conducted in overseas capital markets, and similar studies conducted in Indonesia Stock Exchange by using a long-period data. When

compared with such studies in Indonesia Stock Exchange which used a short-period data (one to two years) then the findings of this study tend to be different. By following Wiley and Zumpano (2009), the use of long-period data in this study was done to avoid misleading results.

This study also found that the Turn of Month has a significant positive influence on stock returns in Indonesia Stock Exchange. This is consistent with previous studies done abroad. This indicates that the payment system adopted in Indonesia and the investment policy adopted by individual investors and institutional investors influence the behavior of stock returns in Indonesia Stock Exchange.

The influence of the trading days and Turn of Month on stock return in Indonesia Stock Exchange has some implication for stock investors in stock trading transactions in Indonesia Stock Exchange. The *buy low sell high* strategy can be done by way of purchasing shares by the end of sessions on Monday in the event of a decline, and making sales on Friday when the stock price increases. Furthermore, investors should consider to buy shares at the end of the month and make sales in the early days of the month when there is an increase in the stock price.

Although this study used a long-period data (the period of approximately 17 years), it did not make separation analysis during specific periods, such as the period after financial crisis and post-global financial crisis. Moreover, the interaction needs to be made between the daily stock behavior with the turn-of-month stock behavior. Therefore, the future similar studies need to accommodate these aspects.

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