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Superstitious behavior and stock returns: The case of Javanese traditional calendar

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Article Info

Abstract

Some Indonesian people who are still attached to traditional rituals, often mark several days on their Javanese calendar as sacred days. This study aims to investigate the influence of the sacred days between daily cycles in Georgian calendar with *pasaran* cycle in Javanese calendar toward Jakarta Composite Index (JCI) returns in a period of January 2009–June 2016. The data was analyzed using Generalized Autoregressive Conditional Heteroscedasticity in Mean (GARCH-M). This study found some sacred days i.e. *Kliwon* Friday and *Wage* Thursday resulted in a lower return than the normal day, while *Wage* Thursday had a significant effect on the return of the Jakarta Composite Index (JCI). These findings indicated that investment decisions made by investors were still influenced by superstition, which leads to behavior bias.

Introduction

The irrationality of an investor in decision-making is also related to his belief in a superstition. The belief in superstition can affect investors' perceptions and ultimately impact on irrational decision making. Such behavior is commonly found in certain circles such as gamblers, athletes, and students (Vyse, 1997). This behavior can also be found among investors. Liu (2010) and Robiyanto, Hersugondo, and Puryandani (2015) stated that culture, belief and superstition can influence the process of behavior formation in financial markets as a symbol of social psychology. The existence of superstition in the financial markets itself arose when Kolb and Rodriguez (1987) introduced this concept through their research on "Friday the 13th" effect. The results of the Kolb and Rodriguez (1987) study showed that the average return on "Friday the 13th" is significantly lower than that of the other Fridays, proving the hypothesis that superstition is capable of affecting the stock market. Research conducted by Kolb and Rodriguez (1987) was the beginning of other studies which tried to prove the existence of anomalies based on superstition in the capital market. This study was then followed by Coutts (1999), Lucey (2001), and Patel (2009).

The existence of anomalies based on culture, belief and superstition is not limited to the phenomenon of Friday the 13th. Researches on other phenomena related to the cultures, beliefs and superstitions of each place were also widely investigated in other parts of the world. Chung and Li (2013) examined the influence of the superstition of good days and bad days based on Chinese culture on the currency return period of 1972–2011. In Chinese culture, number three is believed to have a growing significance,

and number eight is believed to have meaning on prosperity, while these two numbers and their combinations, i.e. days dated on the 3rd, 13th, 23rd, 8th, and 28th are considered good days. Yuan, Zheng, and Zhu (2006) evaluated the relationship between moon phases and stock returns in 48 countries. The moon phase is divided into four groups, namely the new moon, first quarter, full moon, and last quarter. The results showed that stock return in the days of a full moon is lower than the new moon.

A research by Yuan et al. (2006) was further examined by Liu (2010) who examined the effects of the Chinese calendar or so-called Chinese Farmer's Calendar on ten capital markets in East Asia in a period of 1995−2004. The research was based on Chinese people's belief that Chinese Farmer's Calendar provides advice on daily activities, indicated by the use of Chinese Farmer's Calendar to choose good dates and avoid bad dates for weddings, building ceremonies, funerals, and business activities. The research by Liu (2010) showed that there is a lunar calendar effect based on a Chinese farmer's calendar that plays a role in predicting market returns in Taiwan, Singapore, and South Korea.

Unfortunately, research on calendar effects based on culture, beliefs, and superstitions are still rarely found in Indonesia. Robiyanto and Puryandani (2015) were believed to be the first researchers in Indonesia to examine the phenomenon of calendar effect based on superstition on the capital market. Robiyanto and Puryandani (2015) examined whether days in the Javanese calendar affected the return of the Jakarta Composite Index. The research of Robiyanto and Puryandani (2015) was based on the fact that there was an indigenous culture similar to that of oriental societies associated with calendaring in Indonesia. Javanese ethnic group as the largest ethnic group in Indonesia (42.65 percent) has a Javanese calendar system which is similar to the Chinese Farmer's Calendar in China. Robiyanto and Puryandani (2015) research was then followed by Hermin and Mahadwartha (2018), who conducted a study by using a traditional calendar named Primbon in Javanese culture.

In Javanese culture, there is a term of calculation and pena'asan (bad luck) in Javanese numerology culture. The term of the calculation comes from the word itung which means counting and pena'asan derived from the word na'as meaning bad, so the itung and pena'asan can be interpreted as calculating the value of the numbers in the numerology system to avoid bad luck (Muhaimin, 2006). The result of this cultural calculation is the existence of days that are considered important and sacred for the Javanese. For example, the Javanese ethnic group considers Wage Thursday and Kliwon Friday as one of the special or sacred days among others.

For the Javanese ethnic group, Kliwon Friday is often regarded as one of the most frightening days. This Javanese ethnic belief is almost the same as the belief in the western country on Friday the 13th (Robiyanto & Puryandani, 2015). Javanese believe that on the eve of Kliwon Friday the demons reach their supreme power to kill humans. People also believe that on the eve of Kliwon Friday, demons will kill as many humans as possible before dawn. When dawn comes, God will come to punish the evil spirits and send them back to hell. The day of Wage Thursday is also believed to be a dangerous day because it is considered to bring bad luck to someone (Robiyanto & Puryandani, 2015).

Behavioral finance is a science that seeks to explain and improve the understanding of investors' behavioral patterns, including the emotional processes involved and the extent to which emotional processes affect the decision-making process (Ricciardi & Simon, 2000). Pompian (2006) divided the topic of behavioral finance into two forms, namely behavioral finance-macro and behavioral finance-micro. Macro detects and describes anomalies in efficient market hypotheses that can be explained by behavioral models, whereas micro studies the behavior or biases of individual investors that distinguish them from rational investors as illustrated in classical economic theory. This research was conducted to investigate the behavioral finance-micro related to the investors' behavior toward the sacred days in the Javanese calendar.

Considering the presence of Java island as the home for the majority of capital market investors in Indonesia (79.06 percent) and Javanese as the largest ethnic group in Indonesia (42.65 percent), which has a strong belief in the sacred days in Javanese calendar system, the research question of this study is "Does the sacred days in the Javanese calendar affect the return of JCI?". This research is done to provide evidence of the influence of Kliwon Friday, Wage Thursday, and Pon Wednesday toward the return of JCI.

Literature Review

According to Robiyanto and Puryandani (2015), there are two types of calendar systems. They are the theological calendar systems such as Georgian, Islamic and the Caka or Hindu calendar system and cultural calendar systems such as the Chinese and Javanese calendar system. From the existing calendar system, the Javanese calendar system is considered unique because it combines Islamic, Hindu, Javanese, and Buddhist culture and a little mix of western culture. In the Javanese lunar calendar, time calculations are separated by several cycles, i.e. weekly cycles consisting of 7 days (Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday), pancawara or market cycle (Legi, Pahing, Pon, Wage, Kliwon), the monthly cycles of mangsa and wulan, the annual cycles of the year, and the eight-year cycle called windhu.

The Javanese lunar calendar system appears as a result of itung and pena'asan namely Javanese numerology culture. The term of the calculation comes from the word itung which means counting and pena'asan derived from the word na'as meaning bad, so the itung and pena'asan can be interpreted as calculating the value of the numbers in the numerology system to avoid bad luck. The calculation of Javanese numerology is based on the calendar of the moon and the solar system which is done by counting certain values inherent in each calendar (Muhaimin, 2006).

According to Muhaimin (2006), in most areas in Java, there are two methods of calculating the day in a week. The first is the weekly cycle or 7 days and the second is the five-day market cycle or market day. For each method, each day has its jejer. The combination between the market cycle or pancawara, the seven days cycle and its jejer are shown in Table 1.

Table 1
The weekly cycle of *Jejer* (Georgian calendar) and *Pancawara* cycle

Days of Georgian Calendar	*Jejer*	Days of Pancawara Cycle	*Jejer*
Friday	1	*Kliwon*	1
Saturday	2	*Legi*	2
Sunday	3	*Pahing*	3
Monday	4	*Pon*	4
Tuesday	5	*Wage*	5
Wednesday	6		
Thursday	7		

Note. Adapted from Robiyanto and Puryandani (2015)

Muhaimin (2006) stated that Friday is the most important day of the weekly cycle because Friday is the first line. Therefore days in weekly cycles are sorted from Friday to Thursday. In the market cycle or *pancawara*, *Kliwon* is considered to be the most important day because *Kliwon* also lies in the first line, so that day in a market cycle or *pancawara* is sorted from *Kliwon* to *Wage*. The most significant moment between these two cycles occurs every 35 days, i.e., when the first *jejer* in the weekly cycle meets the first *jejer* in the *pancawara* cycle known as *Kliwon* Friday. Robiyanto and Puryandani (2015) also stated that the days preceding *Kliwon* Friday is also able to influence the stock return because investors can take preventive action to avoid that *Kliwon* Friday. Based on the above explanation, the hypothesis formed are formulated as follows:

H1: *Kliwon* Friday has a significant effect on the return of the Jakarta Composite Index (JCI).

H2: *Wage* Thursday has a significant effect on the return of the Jakarta Composite Index (JCI).

H3: *Pon* Wednesday has a significant effect on the return of the Jakarta Composite Index (JCI).

Methodology

The data used in this study was daily JCI closing price during a period of 2009–2016.

Variables

The JCI was used in this study because it contains all listed companies in Indonesia Stock Exchange so that the fluctuation rate of JCI could reflect the overall fluctuation rate of the existing stock on the Indonesia Stock Exchange (IDX). The return of JCI in this study was calculated by using the following formula (Robiyanto & Puryandani, 2015; Robiyanto, Wahyudi, & Pangestuti, 2017):

$$Return \ of \ JCI_t = \frac{JCI_t - JCI_{t-1}}{JCI_{t-1}} \qquad (1)$$

Notes:
JCI_t: closing price of JCI at period t
JCI_{t-1}: closing price of JCI at period t-1.

The days in the Javanese calendar in this study used dummy variables. A value of 1 was given if the days were *Wage* Thursday, *Kliwon* Friday or *Pon* Wednesday, while a value of 0 was given if it was a day other than *Wage* Thursday, *Kliwon* Friday or *Pon* Wednesday.

Data Analysis

The data was analyzed using Generalized Autoregressive Conditional Heteroscedasticity (GARCH) model. The GARCH model used in this study was the Generalized Autoregressive Conditional Heteroskedasticity in Mean (GARCH-M) model by using the log function into the equation of the mean, where the conditional variance coefficient value in the mean equation was interpreted as the risk awakening power (Nyberg, 2010). One of the requirements to perform the GARCH test is that the data must be stationary, so before the GARCH-M test, Augmented Dickey-Fuller (ADF) test was performed, as was the ARCH-LM test to see if heteroscedasticity problem occured in the data. The GARCH-M model used in this study according to Robiyanto and Puryandani (2015) was as follows.

$$Return \ of \ JCI_t = \beta Trading \ Day + \lambda\sigma^2_t + \varepsilon_t \qquad (2)$$

Notes:
β: coefficient
$\lambda\sigma^2_t$: Variance at period t.
ε_t: Residual at period t.

Findings and Discussion

Descriptive Statistics

Table 2 shows that the average return on *Pon* Wednesday day is .0658 percent. The average return on *Pon* Wednesday day is lower than the average of usual Wednesday as much as .3290 percent. Trade risk reflected by the standard deviation on *Pon* Wednesday is 1.3577 percent, higher than usual Wednesday 1.1255 percent. Descriptive statistical results show that *Pon* Wednesday day results in lower returns and has a higher risk compared to usual Wednesday.

The average return on *Wage* Thursday is .0071 percent. The average day-to-day return of *Wage* Thursday is lower than the average of usual Thursday as much as .0528 percent. The trading risk on *Wage* Thursday is 1.1333 percent, lower than usual Thursday as much as 1.2555 percent. Descriptive statistical results show that *Wage* Thursday results in a lower return than the usual Thursday. Descriptive statistical results also indicate that *Wage* Thursday yields the lowest average return compared to other days. The average return on *Kliwon* Friday is .0311 percent and lower than average Friday's average return of .1222 percent. The trading risk on *Kliwon* Friday is 1.0927 percent, higher than usual Friday of 1.0636 percent. Descriptive statistical results show that *Kliwon* Friday yields a lower average return and higher risk than usual Friday.

The standard deviation value of all days listed in Table 2 shows equivalent value. It means that the spread of the data in Table 2 is similar. In other words, the standard deviation values of all days in the statistical data set are close to the mean of the data set.

The results show that the days considered sacred by the Javanese tend to produce a lower return compared to normal days. The day with the lowest return is *Wage* Thursday, where it is the day that lies on the last line of the combination of the

Table 2
Descriptive statistics

	Pon Wednesday	Usual Wednesday	Wage Thursday	Usual Thursday	Kliwon Friday	Usual Friday
Mean	.0658%	.3290%	.0071%	.0528%	.0311%	.1222%
Maximum	4.2462%	7.2654%	3.2493%	4.7793%	2.8533%	3.4489%
Minimum	−3.8113%	−3.6943%	−3.1632%	−8.8804%	−4.8627%	−4.4329%
Std. Dev.	1.3557%	1.1255%	1.1333%	1.2555%	1.0927%	1.0636%
n	73	302	71	289	70	290

Georgian calendar's daily cycle with the Javanese calendar cycle, and the day with the highest trading risk is *Pon* Wednesday where it is the day before the sacred day.

The Data Stationery Test

Table 3 presents the ADF probability values of Wednesday, Thursday, Friday, and all days, with $p < .01$. Therefore, it can be said that the data does not contain the root unit or the data has been stationary.

The ARCH-LM Test

Table 4 shows that the probability value F on *Pon* Wednesday vs. All day equation is .0000, *Wage* Thursday vs. all days is .0000, and *Kliwon* Friday vs. all days is .0000. Since $p < .01$, there is an ARCH effect or heteroscedasticity occuring so that the GARCH model can be used. Also, the ARCH-LM test results also show that the day t-1 volatility influences the day t return, so it was necessary to include the variance equations in the model. Therefore, the GARCH-M model was used.

The GARCH-M Test

Table 5 shows that the coefficient value of *Kliwon* Friday equation vs. All day equation is −.00050 with $p > .10$. The negative sign of the regression coefficient indicates that *Kliwon* Friday has a negative impact on stock return, but it is not significant. Based on the results of the GARCH-M test, it can be concluded that *Kliwon* Friday is considered as one of the sacred days and is the day that lies on the first line of combination between the Georgian calendar and the Javanese calendar, which did not affect the stock market return in the period of 2009–2016. The result of the study contrasts Hypothesis 1 stating that *Kliwon* Friday has a significant effect on the return of the Jakarta Composite Index (JCI).

This result is in line with a research by Robiyanto and Puryandani (2015) which showed that *Kliwon* Friday does not significantly affect the return of the Jakarta Composite Index (JCI). "*Kliwon* Friday" has no significant effect on the

return of the Jakarta Composite Index (JCI) as Friday has a positive effect on most people. Friday's positive effects appear as Friday is the day for Muslims, as the majority, to do Friday prayer and these positive effects are greater than *Kliwon* Friday's negative effects. This makes people take less notice of the sanctity of *Kliwon* Friday.

The regression coefficient on *Wage* Thursday vs. All day equation shows the value of the regression coefficient of −.00197 with $p < .10$. The negative sign on the regression coefficient indicates that *Wage* Thursday has a negative impact on stock returns. The probability value of .06840 is smaller than $p = .10$ indicating that *Wage* Thursday has a significant effect. Based on the results of the GARCH-M test, it can be concluded that *Wage* Thursday is considered to bring bad luck to some, and it is the day that lies on the last *jejer* combination between the Georgian and the Javanese calendar having a significant effect on stock market returns in the period 2009–2016. The result of the study accepts Hypothesis 2 stating that *Wage* Thursday has a significant effect on the return of the Jakarta Composite Index (JCI).

The significant effect of *Wage* Thursday on the return of the Jakarta Composite Index (JCI) is also supported by descriptive statistic which shows that *Wage* Thursday is the day that produces the lowest return. These results are different from a study by Robiyanto and Puryandani (2015) which showed that *Wage* Thursday did not significantly affect the return of the Jakarta Composite Index (JCI). The influence of *Wage* Thursday on the return of Jakarta Composite Index (JCI) could be caused by the traditional mindset of people who still believe in the superstition of *Wage* Thursday as a bad day. This caused investors to act irrationally on *Wage* Thursday day by selling shares owned or not making a purchase on *Wage* Thursday, resulting in an imbalance between supply and demand and pushing the return lower on *Wage* Thursday, which was also supported by descriptive statistical results.

The GARCH-M-test results on *Pon* Wednesday vs. All day equation results in a coefficient value of −.00043 with a $p > .10$. The negative sign on the regression coefficient also shows that *Pon* Wednesday has a negative impact on stock returns, but it is not significant. The GARCH-M-test shows

Table 3
Augmented-Dickey Fuller test (ADF-test)

Days	t-Statistic	p
Wednesday	−21.1059	.0000
Thursday	−17.66601	.0000
Friday	−19.62594	.0000
All day	−26.69559	.0000

Note. $p < .01$

Table 4
ARCH-LM-test

Equation	F-Statistic	p
Pon Wednesday vs. All day	32.04101	.0000
Wage Thursday vs. All day	32.17839	.0000
Kliwon Friday vs. All day	31.94157	.0000

Note. $p < .01$

Table 5
The GARCH-M-test

		Coefficient	Std. Error	z-Statistic	p
Pon Wednesday vs All day	LOG (GARCH)	−.00007	.00003	−2.70194	.00690
	Pon Wednesday	−.00043	.00091	−.47560	.63440
Wage Thursday vs All day	LOG (GARCH)	−.00008	.00003	−2.96463	.00300
	Wage Thursday	−.00197	.00108	−1.82232	.06840
Kliwon Friday vs All day	LOG (GARCH)	−.00007	.00003	−2.71941	.00650
	Kliwon Friday	−.00050	.00103	−.48373	.62860

Note. $p < .10$.

that *Pon* Wednesday as the day before a sacred day has no significant effect on the stock return in the period of 2009 −2016. The result contrasts Hypothesis 3 stating that *Pon* Wednesday has a significant effect on the return of the Jakarta Composite Index (JCI). The results of this study are in line with the results of a research by Robiyanto and Puryandani (2015) which showed that *Pon* Wednesday did not significantly affect the return of the Jakarta Composite Index (JCI). *Pon* Wednesday, which does not affect the return of the Jakarta Composite Index, occurs because basically in the combination between daily cycles in the Georgian calendar with market cycles in the Javanese calendar, *Pon* Wednesday does not fall into the day that is considered important or sacred. Besides, there is no belief in Javanese culture that considers *Pon* Wednesday is a bad day or a day to be avoided.

Also, by elaborating the conditional variance coefficient value in the mean equation, the study also looked at the effect of days considered sacred based on the Javanese calendar and risk aversion of investors. In *Kliwon* Friday vs. All day equation, the coefficient value is −.00007 with $p < .10$. This shows that *Kliwon* Friday has a significant effect on risk aversion. In *Wage* Thursday vs. All day equation, the coefficient value is −.00008 with $p < .10$. The result of *Wage* Thursday vs. All-day equation indicates that *Wage* Thursday has a significant effect on investor risk aversion. Also, the conditional variance coefficient value on *Wage* Thursday is the largest among the three sacred days followed by *Pon* Wednesday and *Kliwon* Friday. In *Pon* Wednesday vs. All day equation, the conditional variance coefficient value in the mean equation is −.00007 with $p < .10$. The value of the conditional variance coefficient and the probability value indicates that *Pon* Wednesday has a significant effect on investor risk aversion indicating that the investor is risk-averse. A significant influence on sacred days on risk aversion may imply that investors need greater risk compensation with increased risks. Therefore, to make investors willing to take certain risks in investing, sufficient compensation should be provided. This is also in line with Frieder and Subrahmanyam (2004) who stated that religious and cultural occasions could embody different emotions.

Conclusion and Recommendation

This study is a behavioral finance research that aims to investigate the influence of the sacred day superstition based on the calculation of *jejer* between daily cycles in the Georgian calendar with the market cycle in the Javanese calendar to the return of the Jakarta Composite Index (JCI) from a period of 2009−2016. Based on descriptive statistics results, the study found that *Kliwon* Friday and *Wage* Thursday, which are believed to be sacred days, and

Pon Wednesday resulted in a lower return than the normal day. Based on the results of the GARCH-M-test, it could be concluded that only *Wage* Thursday has a significant effect on the return of the Jakarta Composite Index (JCI). The results of this study indicate that investment decisions made by Indonesian investors are still influenced by the superstition of the sacred days, which leads to behavioral biases.

This study has not considered in detail about the behavior of the investor on sacred days and the market condition (bullish or bearish). There are some suggestions for further research which are expected to improve this research. The future research can do an in-depth interview with investors who believe in *Kliwon* Friday, *Wage* Thursday and "*Pon* Wednesday" as a bad day or sacred days to prove whether the investment decision of the investor is influenced by the sacred days. Also, further research can also use the Islamic calendar to test calendar anomalies, since 87.2 percent of Indonesians are Muslim. A future study can also elaborate on the behavior of investor on sacred days and the market condition (bullish or bearish).

Conflict of Interest

Authors declare that there is no conflict of interest.

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