
QUADRUPLE WITCHING DAYS AND ABNORMAL RETURNS ANALYSIS IN THE INDONESIAN STOCK MARKET

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ABSTRACT

KEYWORDS

Quadruple Witching Days, Abnormal Return, LQ45, and SRI-KEHATI

The aim of this research is to analyze the Quadruple Witching Days phenomenon and its impact on abnormal returns on the Indonesian stock market. This phenomenon has attracted the attention of many investors and academics, because it is believed to be able to significantly influence stock price movements. It is hoped that the results of this research can provide an in-depth understanding of the influence of Quadruple Witching Days on the Indonesian capital market. Associative descriptive research tests the influence of Quadruple Witching Days. Using secondary data and library methods in the LQ45 and SRI-KEHATI stock indices listed on the Indonesia Stock Exchange for the period 2010 to 2022 with daily and weekly data. The hypothesis test that will be used in this research is the Paired Sample t - Test and the non-parametric Mann-Whitney test. There are differences in abnormal returns before and after the Quadruple Witching Days event on the LQ45 stock index. There is no difference in abnormal returns before and after the Quadruple Witching Days event on the SRI-KEHATI stock index. High Vigilance, Quick Selling or Buying, Portfolio Diversification as a consideration for taking profits for investors LQ45, Long Term Investment Approach, Portfolio Stabilization may be more suitable with investment strategies because there is no significant difference in abnormal returns, investors in SRI-KEHATI.

INTRODUCTION

The capital market plays a crucial role in the economy of a country, connecting those with funds (investors) and those in need of funds (issuers). The economic and financial functions of the capital market create opportunities for investors to obtain returns according to investment criteria. Key products in the capital market include stocks, debt securities, commercial papers, bonds, and various derivatives. The derivative market, especially in Indonesia, has evolved with the introduction of the Jakarta Futures Exchange (BBJ) in 2000. BBJ trades various commodity futures products, considering Indonesia's wealth in natural resources. In the derivative market, futures contracts have become one of the most sought-after products, offering opportunities for returns.

Investors in the derivative market expect reasonable returns, which can only occur if the capital market is efficient. An efficient capital market reflects relevant information, and investors behave rationally, influencing the supply and demand for capital market instruments. However, not all capital markets are efficient, and inefficiencies can lead to price divergences. One example of irrational investor behavior is observed during Quadruple Witching Days, where several derivative contracts expire on the same day, creating significant volatility and market whipsaws. This phenomenon has been a focus of research in various markets, including the United States and cryptocurrencies.

Previous research has shown diverse results, such as anomalies in abnormal returns on Quadruple Witching Days in the U.S. stock market, while in the cryptocurrency market, the

effects are only nominal. Research results also highlight the expiration effects of futures contracts on the spot market. This study will explore the phenomenon of Quadruple Witching Days in the Indonesian capital market, with a focus on the Indonesia Stock Exchange (IDX). The goal is to identify whether Quadruple Witching Days have a significant impact on abnormal returns in the Indonesian stock market.

Based on the above background, this research identifies several problems. First, stock returns are challenging to predict due to complex factors. Second, there are anomalies in the market that deviate from shareholder expectations. Third, market fluctuations increase investment risk. Fourth, differences in previous research results indicate the need for in-depth research. The research problem is whether Quadruple Witching Days provide abnormal returns in the Indonesian stock market. The research objective is to empirically prove the influence of Quadruple Witching Days on abnormal returns in the Indonesian stock market. The contribution of this research includes academic benefits by contributing to the development of evaluations regarding the Efficient Market Hypothesis and practical benefits by providing guidance for investment decision-making and serving as a reference for issuers facing Quadruple Witching Days. The author is interested in researching the phenomenon of Quadruple Witching Days in stock trading on the Indonesia Stock Exchange, with the title "Analysis of Quadruple Witching Days and Abnormal Returns in the Indonesian Stock Market."

RESEARCH METHOD

This study employs a quantitative design with a positivist quantitative approach. The research method can be categorized as descriptive associative, aiming to obtain information about phenomena, provide an overview of the phenomenon, and explain the relationships among related factors. The independent variable is Quadruple Witching Days (X), a market event where derivative contracts expire on the same day, creating significant volatility. The dependent variable is Abnormal Return (Y), the difference between actual and expected returns. The research population includes companies in the LQ45 and SRI-KEHATI stock indices on the Indonesia Stock Exchange, with the sample selected using purposive sampling from 2010 to 2022. Data collection involves using secondary data from the Indonesia Stock Exchange, and data analysis includes descriptive statistics, normality tests, and hypothesis testing. Hypothesis testing is conducted to examine the significance of the influence of Quadruple Witching Days on Abnormal Return in the LQ45 and SRI-KEHATI stock indices, with the criterion of p-value < 0.05 to reject the null hypothesis.

RESULTS AND DISCUSSION

Descriptive Statistical Analysis

To understand the differences in abnormal returns before and after Quadruple Witching Days, a descriptive analysis is conducted. This analysis describes abnormal returns from 2010 to 2022, utilizing calculations such as mean, minimum and maximum values, and standard deviation. The data description includes daily and weekly data for the LQ45 and SRI-KEHATI indices. The descriptive data for these three indices are detailed below:

LQ45 Index Abnormal Return

Abnormal descriptions of LQ45 index returns before and after the *Quadruple Witching Days* event can be seen in Table 1:

Table 1. illustrates the descriptive statistics of the LQ45 index's abnormal return before and after Quadruple Witching Days (Daily)

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Before	51	-,004676	,002299	-,00011026	,001192845
After	51	-,004997	,000971	-,00092912	,001671687
Valid N (listwise)	51				

Source : processed data

Based on the table above, it is known that the *abnormal average return* of the LQ45 index before the *quadruple witching days* event during 2010 - 2022 ranged from -0.004676 to 0.002299 with an average of -0.00011026. This shows that the lowest abnormal return of the LQ45 index before the quadruple witching days event is -0.004676 while the highest abnormal return before the quadruple witching days event is 0.002299. With a negative average magnitude indicates that the abnormal return of the LQ45 index before the quadruple witching days event has a downward trend. Then the abnormal average return of the LQ45 index after the quadruple witching days event during 2010 - 2022 ranged from -0.004997 to 0.000971 with an average of -0.000929. This shows that the lowest abnormal return of the LQ45 index after the quadruple witching days event is -0.004997 while the highest abnormal return after the quadruple witching days event is 0.000971. With a negative average magnitude indicates that the abnormal return of the LQ45 index after the quadruple witching days event has a downward trend.

Based on the cumulative abnormal return (CAR) value before the quadruple witching days event has a tendency to increase (positive), while the cumulative abnormal return value after the quadruple witching days event tends to decrease (negative). This indicates a negative response from the market to the LQ45 stock index after the quadruple witching days. Then the standard deviation value is also obtained it is known that the abnormal standard deviation value of the LQ45 index return before the quadruple witching days event of 0.001119 is smaller than the value of the abnormal standard deviation return after the quadruple witching days event, which is 0.00167. These results show that the risk level of trading the LQ45 index before the quadruple witching days event is lower than the conditions after the quadruple witching days event.

Then the abnormal description of the weekly data return is explained as follows:

Table 1. Description of Abnormal Return Index LQ45 Before and After the Quadruple Witching Days Event (Weekly)

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Before	51	-,043784	,011844	-,0012947	,0087467
After	51	-,007457	,041785	,0048632	,0130691
Valid N (listwise)	51				

Source: processed data

Based on the table above, it is known that the abnormal average return of the LQ45 index before the quadruple witching days during 2010 - 2022 ranged from -0.043784 to 0.011844 with an average of -0.0012947. This shows that the lowest abnormal return of the LQ45 index before the quadruple witching days event was -0.043784 while the highest abnormal return before the quadruple witching days event was 0.011844. With a negative

average magnitude indicates that the *abnormal return* of the LQ45 index before the *quadruple witching days* event has a downward trend.

Then the *abnormal average return* of the LQ45 index after the *quadruple witching days* event during 2010 - 2022 ranged from -0.007457 to 0.041785 with an average of 0.0048632. This shows that the lowest abnormal return of the LQ45 index after the quadruple witching days event is -0.007457 while the highest abnormal return after the quadruple witching days event is 0.041785. With a positive average magnitude indicates that the *abnormal return* of the LQ45 index after the *quadruple witching days* event has an increasing trend.

The cumulative abnormal return (CAR) value before the quadruple witching days event has a tendency to decrease (negative), while the cumulative abnormal return value after the quadruple witching days event tends to increase (positive). This indicates a positive response from the market to the LQ45 stock index after the quadruple witching days. Then the standar deviation value is also obtained it is known that the value of the abnormal standard deviation return of the LQ45 index before the quadruple witching days event of 0.0087467 is smaller than the value of the abnormal standard deviation return after the quadruple witching days event, which is 0.013069. These results show that the risk level of trading the LQ45 index before the quadruple witching days event is lower than the conditions after the quadruple witching days event.

SRI-KEHATI Index Abnormal Return

Abnormal descriptions of SRI-KEHATI index returns before and after the *Quadruple Witching Days* event can be seen in Table 3:

Table 2 Description of Abnormal Return of SRI-KEHATI Index Before and After Quadruple Witching Days Event (Daily)

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Before	51	-,006816	,003487	-,00018704	,0019782
After	51	-,003273	,002909	,00021460	,0015083
Valid N (listwise)	51				

Source : processed data

Based on the table above, it is known that the *abnormal average return* of the SRI-KEHATI index before the *quadruple witching days* event during 2010 - 2022 ranged from -0.006816 to 0.003487 with an average of -0.00018. This shows that the *lowest abnormal return of the SRI-KEHATI index* before the quadruple witching days event was -0.006816 while the highest abnormal return before the quadruple witching days event was 0.003487. With a negative average magnitude, it indicates that the *abnormal return* of the SRI-KEHATI index before the quadruple witching days event has a downward trend.

Then the *abnormal average return* of the SRI-KEHATI index after the *quadruple witching days* event during 2010 - 2022 ranged from -0.003273 to 0.002909 with an average of 0.00021. This shows that the *lowest abnormal return of the SRI-KEHATI index* after the quadruple witching days event is -0.003273 while the highest abnormal return after the quadruple witching days event is 0.002909. With a positive average magnitude, it shows that the *abnormal return* of the SRI-KEHATI index after the *quadruple witching days* event has an increasing trend.

Based on the data, it is explained that the cumulative abnormal return (CAR) value before the quadruple witching days event has a negative tendency, as well as the abnormal cumulative value of return after the quadruple witching days event which also tends to be

negative. This indicates that there were negative respondents from the market to the SRI-KEHATI stock index before and after the *quadruple witching days event*.

Based on the standard deviation value, it is known that the value of the *abnormal standard deviation return* of the SRI-KEHATI index after the *quadruple witching days event* of 0.00150 is smaller than the value of the *abnormal standard deviation return* before the *quadruple witching days event*, which is 0.00197. These results show that the risk level of trading in the SRI-KEHATI index after the *quadruple witching days event* is lower than the conditions before the *quadruple witching days event*.

Then to find out the abnormal description of weekly returns is explained as follows:

Table 3 Abnormal Description of SRI-KEHATI Index Return Before and After Quadruple Witching Days Event (Weekly)

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Before	51	-,077843	,026369	-,00284311	,01496866
After	51	-,021611	,029032	-,00166244	,00945329
Valid N (listwise)	51				

Source: processed data

Based on the table above, it is known that the *abnormal average return* of the SRI-KEHATI index before the *quadruple witching days event* during 2010 - 2022 ranged from -0.077843 to 0.026369 with an average of -0.00284311. This shows that the *lowest abnormal return of the SRI-KEHATI index before the quadruple witching days event* was -0.077843 while the *highest abnormal return before the quadruple witching days event* was 0.026369. With a negative average magnitude, it indicates that the *abnormal return of the SRI-KEHATI index before the quadruple witching days event* has a downward trend.

Then the *abnormal average return* of the SRI-KEHATI index after the *quadruple witching days event* during 2010 - 2022 ranged from -0.021611 to 0.029032 with an average of -0.00166244. This shows that the *lowest abnormal return of the SRI-KEHATI index after the quadruple witching days event* is -0.021611 while the highest abnormal return after the *quadruple witching days event* is 0.029032. With a negative average magnitude indicates that the *abnormal return of the SRI-KEHATI index after the quadruple witching days event* has a downward trend.

Based on the standard deviation value, it is known that the abnormal standard deviation value of the *SRI-KEHATI index return after the quadruple witching days event* of 0.009453 is smaller than the value of the abnormal *standard deviation return* before the *quadruple witching days event*, which is 0.014968. These results show that the risk level of trading in the SRI-KEHATI index after the *quadruple witching days event* is lower than the conditions before the *quadruple witching days event*.

Data Analysis Results

Analysis of the effect of quadruple witching days events on abnormal returns of the LQ45 index

Data Normality Test

To perform a different test, it is required to do a normality test first. This test is carried out to determine whether the data used for analysis purposes is normally distributed or not. The results of this test will later be used to determine the analytical tools used. If the data is normally distributed, then the hypothesis test is carried out by parametric test analysis using the *Paired Sample T-test* test while if the data is not normally distributed, the hypothesis test

is carried out nonparametric test analysis using the *Mann Whitney test*. The data normality test in this study used the *Kolmogorov-Smirnov Test*.

In the Kolmogorov-Smirnov test, the data were normally distributed or not by comparing the value of *asym.sig (2-tailed)* with a signification value of 0.05. It is said to be normally distributed if the value of *asym.sig (2-tailed)* is greater than the significance level of 0.05. Then if the value of *asym.sig (2-tailed)* is equal to or less than the signification of 0.05, then the data is said to be not normally distributed. The results of the abnormal normality test of return of the LQ45 index using daily data are shown by the table as follows:

Table 5 Abnormal Return Normality Test Results LQ45 Index (Daily)

Tests of Normality							
	Code	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Average	before	,195	51	,000*	,846	51	,000
Abnormal Return	after	,247	51	,000	,871	51	,000

Sumber: data diolah

Then the results of the normality test using weekly data obtained the following results:

Table 6 LQ45 Index Return Abnormal Normality Test Results (Weekly)

Tests of Normality							
	Code	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Average	before	,215	51	,000*	,731	51	,000
Abnormal Return	after	,315	51	,000	,753	51	,000

Source: processed data

Based on the results of the above test it is known that the df value is greater than 50, so the normality test is carried out with the Kolmogorov-Smirnov test. From the results of the normality test with known significance values of abnormal returns, both using daily and weekly data before the quadruple witching days event of 0.000 and abnormal returns after 0.000. This shows that all significance values are smaller than the significance level of 0.05. Thus, it can be said that abnormal data on LQ45 index returns, both daily and weekly data are not normally distributed, so testing the hypothesis for abnormal returns on the LQ45 index in this study uses the *Mann Whitney test*.

Test the hypothesis of abnormal difference in LQ45 index return

The results of the abnormal difference hypothesis test of LQ45 index returns before and after the quadruple witching days event using the *Mann Whitney test* are described by the following table:

Table 74 Abnormal Difference Hypothesis Test of LQ45 Index Return Before and After the Quadruple Witching Days Event

Test Statistics ^a		
	Abnormal Return (daily)	Abnormal Return (weekly)
Mann-Whitney U	987,000	1279,000
Wilcoxon W	2314,000	2605,000
Z	-2,098	-,144
Asymp. Sig. (2-tailed)	,036	,886

a. Grouping Variable: kode
Source: Data Processed

Hypothesis testing is done by comparing *sig values*.(*2-tailed*) with a significance value of 0.05. If the value of *sig*.(*2-tailed*) is greater than 0.05 then Ho is accepted and Ha is rejected and vice versa if the value of *sig*.(*2-tailed*) smaller than 0.05 then Ho is rejected and Ha is accepted. Based on the test results using daily data, the sig value is obtained.(*2-tailed*) of 0.036 which is smaller than 0.05 ($0.036 < 0.05$). While the test results using weekly data obtained sig values.(*2-tailed*) of 0.886 which is greater than 0.05 ($0.886 > 0.05$). Thus testing using daily data then Ho is rejected and Ha is accepted, meaning that there is an abnormal difference in LQ45 index returns before and after the *quadruple witching days* event. Using weekly data, Ho was accepted and Ha was rejected, meaning that there was no abnormal difference in LQ45 index returns before and after the *quadruple witching days*.

This result explains the abnormal return of the LQ-45 stock index on a daily basis has a difference between before and after the *quadruple witching days* event during the study year 2010 – 2022. But on a weekly basis, the abnormal return of the LQ-45 stock index between before and after the *quadruple witching days* event has no difference. This indicates that *the quadruple witching days* event has a significant influence on the abnormal return of LQ-45 stocks only on a daily basis. To further reinforce the results of research on the influence, t-student and Anova analysis was carried out which obtained the results shown by the table as follows:

Table 8 Results of t-Student Analysis of Quadruple Witching Days Event Against Abnormal Return Index LQ45

	One-Sample Test						
	Test Value = 0						
	Daily			Weekly			
	t	df	Sig. (2-tailed)	(2-t	df	Sig. (2-tailed)	
Abnormal Return before QWD	,660	50	,512	-1,057	50	,296	
Abnormal Return while QWD	-2,094	50	,041	-,336	50	,738	
Abnormal Return after QWD	-3,969	50	,000	2,657	50	,011	

Sumber: data diolah

Based on the results of the *one-sample test analysis above*, an abnormal sig (2-tailed) return value was obtained before the quadruple witching days event using daily data of 0.512, when *the quadruple witching days event* was 0.041 and after the quadruple witching days event was 0.000. These results show that during and after the quadruple witching days event has a significance value smaller than 0.05, thus it can be said that there is a difference in the average abnormal return at the time of the quadruple witching days event and after the quadruple witching days event. While using weekly data obtained results before the quadruple witching days event using daily data of 0.296, when the quadruple witching days event was 0.738 and after the quadruple witching days event was 0.011. These results show that after the quadruple witching days event has a significance value smaller than 0.05, thus it can be said that there is an abnormal average difference in return only after the quadruple witching days event.

Then the results of the analysis using Anova analysis are shown by the following results:

Table 9 Anova Analysis Results of Quadruple Witching Days Event Against Abnormal Return LQ45 Index**Test Statistics^a**

	Asymp. Sig. (2-tailed)	
	Daily	Weekly
Before QWD	,258	,853
Now QWD	,721	,023
After QWD	,052	,005

sumber: data diolah

The results of the Anova analysis above obtained significance values before *the quadruple witching days event using daily data of 0.258*, when the quadruple witching days event was 0.721 and after the quadruple witching days event was 0.052. These values are all greater than the value of 0.05. Thus it can be said that the variance between abnormal returns before, during and after the *quadruple witching days event using daily data* has no difference. Then the significance value before *the quadruple witching days event uses weekly data of 0.853*, when the quadruple witching days event is 0.023 and after the quadruple witching days event is 0.005. The significance value during and after the *quadruple witching days event* is less than the value of 0.05. Thus, it can be said that the variance between abnormal returns during and after the *quadruple witching days using weekly data* has differences. The recapitulation of the results of the above analysis is explained as follows:

Table 10 Recapitulation of Quadruple Witching Days Event Analysis Results Against Abnormal Return LQ45 Index

Analisis	Student test	t-	Anova	Mann Whitney	Modified CAR	Total signifikan
d(-1)	-	-	-	-	+	1
d(0)	-	-	-	-	-	-
d(+1)	+	-	+	-	-	2
w(-1)	-	-	-	-	-	-
w(0)	-	+	-	-	-	1
w(+1)	+	+	-	-	+	3

Source: processed data

Analysis of the effect of quadruple witching days on abnormal returns of the SRI-KEHATI index

Data Normality Test

To perform a different test, it is required to do a normality test first. This test is carried out to determine whether the data used for analysis purposes is normally distributed or not. The results of this test will later be used to determine the analytical tools used. If the data is normally distributed, then the hypothesis test is carried out by parametric test analysis using the *Paired Sample T-test* test while if the data is not normally distributed, the hypothesis test is carried out nonparametric test analysis using the *Mann Whitney test*. The data normality test in this study used the *Kolmogorov-Smirnov Test*.

in the Kolmogorov-Smirnov test the data were normally distributed or not by comparing the value of *asympt.sig (2-tailed)* with a significance value of 0.05. It is said to be normally distributed if the value of *asympt.sig (2-tailed)* is greater than the significance level of 0.05. Then if the value of *asympt.sig (2-tailed)* is equal to or less than the significance of 0.05, then

the data is said to be not normally distributed. The abnormal normality test results of SRI-KEHATI index returns are shown by the following table:

**Table 51 Abnormal Return Normality Test Results of SRI-KEHATI Index (Daily)
Tests of Normality**

	Code	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Rata-rata	Before	,123	51	,053	,945	51	,020
Abnormal Return	After	,073	51	,200	,975	51	,348

Source: processed data

Then the results of the normality test using weekly data obtained the following results:

**Table 12 Abnormal Return Normality Test Results of SRI-KEHATI Index (Weekly)
Tests of Normality**

	Code	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Rata-rata	Before	,143	51	,011	,731	51	,000
Abnormal Return	After	,160	51	,002	,753	51	,003

Source: processed data

Based on the results of the above test it is known that the df value is greater than 50, so the normality test is carried out with the Kolmogorov-Smirnov test. From the results of the normality test with known abnormal significance value *of return* with daily data only after the *quadruple witching days* event is greater than 0.05. While using weekly data, both before and after the *quadruple witching days* event the value is smaller than 0.05. This shows that the overall significance value is smaller than the significance level of 0.05. Thus, it can be said that the abnormal *return data of the SRI-KEHATI index*, both daily and weekly data are not normally distributed, so the hypothesis testing for abnormal return of the SRI-KEHATI index in this study uses the *Mann Whitney test*.

Test the hypothesis of *abnormal differences in SRI-KEHATI index returns*

The results of the abnormal difference hypothesis test of *SRI-KEHATI index returns before and after the quadruple witching days event* using the *Mann Whitney test are described by the following table:*

Table 6 Abnormal Difference Hypothesis Test of SRI-KEHATI Index Return Before and After the Quadruple Witching Days Event

Test Statistics ^a		
	Abnormal Return (daily)	Abnormal Return (weekly)
Mann-Whitney U	1156,000	1191,000
Wilcoxon W	2482,000	2517,000
Z	-,967	-,733
Asymp. Sig. (2-tailed)	,333	,464

a. Grouping Variable: kode

Source: Data Processed

Hypothesis testing is done by comparing *sig values*.(*2-tailed*) with a significance value of 0.05. If the value of *sig*.(*2-tailed*) is greater than 0.05 then Ho is accepted and Ha is rejected and vice versa if the value of *sig*.(*2-tailed*) smaller than 0.05 then Ho is rejected and Ha is accepted. Based on the test results using daily data, the sig value is obtained.(*2-tailed*) of 0.333 which is greater than 0.05 ($0.333 > 0.05$). While the test results using weekly data obtained sig values.(*2-tailed*) of 0.464 which is greater than 0.05 ($0.464 > 0.05$). Thus testing using daily data then Ho is accepted and Ha is rejected, meaning that there is no abnormal difference in *SRI-KEHATI index returns before and after the quadruple witching days event*. Similarly, using weekly data, Ho is accepted and Ha is rejected, which means that there is no abnormal difference in *SRI-KEHATI index returns before and after the quadruple witching days event*.

This result explains that the abnormal return of the SRI-KEHATI stock index on a daily and weekly basis has no difference between before and after the *quadruple witching days event* during the 2010-2022 research year. This indicates that the *quadruple witching days event* does not have a significant effect on the abnormal return of SRI-KEHATI shares, both daily and weekly. To further reinforce the results of research on the influence, t-student and Anova analysis was carried out which obtained the results shown by the table as follows:

Table 14 Results of t-Student Analysis of *Quadruple Witching Days Event* Against *Abnormal Return SRI-KEHATI Index*
One-Sample Test

	Test Value = 0						
	Daily			Weekly			
	t	df	Sig. (2-tailed)	(2-t	df	Sig. (2-tailed))
Abnormal Return before QWD	-,675	50	,503	-1,356	50	,181	
Abnormal Return while QWD	-2,492	50	,016	1,057	50	,295	
Abnormal Return after QWD	1,016	50	,315	-1,256	50	,215	

Source: processed data

Based on the results of the *one-sample test* analysis above, an abnormal sig (2-tailed) return value was obtained before the quadruple witching days event using daily data of 0.503, when the quadruple witching days event was 0.016 and after the quadruple witching days event was 0.315. This result shows that when the quadruple witching days event has a significance value smaller than 0.05, thus it can be said that there is an abnormal average difference in return at the time of the quadruple witching days event. While using weekly data, results were obtained before the quadruple witching days event using daily data of 0.181, when the quadruple witching days event was 0.295 and after the quadruple witching days event was 0.215. These results show that both before, during and after the quadruple witching days event have a significance value greater than 0.05 thus it can be said that there is no difference in the average abnormal return just before, during and after the quadruple witching days event. Then the results of the analysis using Anova analysis are shown by the following results:

Table 15 Results of Anova Analysis of *Quadruple Witching Days Event* Against *Abnormal Return of SRI-KEHATI Index*

Test Statistics ^a	Asymp. Sig. (2-tailed)	
	Harian	Mingguan
Sebelum QWD	,069	,162

Saat QWD	,009	,392
Setelah QWD	,733	,860

Source: Data Processed

The results of the Anova analysis above obtained significance values before *the quadruple witching days event using daily data of 0.069*, when the quadruple witching days event was 0.009 and after the quadruple witching days event was 0.733. These values are only at the time of *quadruple witching days events* that are smaller than the value of 0.05. Thus it can be said that variance only at the time of the *quadruple witching days event using daily data* has differences. Then the significance value before *the quadruple witching days event used weekly data of 0.162*, when the quadruple witching days event was 0.392 and after the *quadruple witching days event* was 0.860. All significance values are greater than 0.05. Thus it can be said that the variance between abnormal returns before, during and after the *quadruple witching days event using weekly data* has no difference. The recapitulation of the results of the above analysis is explained as follows:

Table 16 Recapitulation of Quadruple Witching Days Event Analysis Results Against Abnormal Return of SRI-KEHATI Index

Analisis	Student test	t- Anova	Mann Whitney	Modified CAR	Total Significant
d(-1)	-	-	-	-	-
d(0)	+	+	-	-	2
d(+1)	-	-	-	-	-
w(-1)	-	-	-	-	-
w(0)	-	-	-	-	-
w(+1)	-	-	-	-	-

Source: processed data

Discussion of Research Results

The results of the study on Quadruple Witching Days' impact on three stock market indices in Indonesia show varying reactions for each index. The background of each index is quite distinct. LQ45, composed of the 45 stocks with the largest market capitalization on the Indonesia Stock Exchange (BEI), includes a derivative market in Indonesia. The research results indicate a significant influence on the LQ45 index in several analytical tests. Quadruple Witching Days involve the settlement of derivative contracts, including futures contracts, aligning with previous research (Caporale & Plastun, 2023). The LQ45 index is used as the underlying asset for LQ45 Futures contracts. As the contract settlement day approaches, there is high trading activity, and the LQ45 index's price becomes crucial in determining the value of futures contracts. Fluctuations in the prices of these stocks can affect the LQ45 index's value and, consequently, impact the prices of LQ45 Futures contracts. Investors, especially those involved in futures contracts, may adjust their portfolios or rebalance positions in response to Quadruple Witching Days. These actions can create changes in the composition of the LQ45 index and affect the value of futures contracts. The Efficient Market Hypothesis (EMH) assumes that markets react quickly to new information. The analysis results may reflect how efficiently the LQ45 stock market responds to Quadruple Witching Days.

SRI-KEHATI includes stocks with good financial performance and social responsibility. The research results for the SRI-KEHATI index show an impact only on the event day, with no significant effects on the days before and after the event. This aligns with previous research

(Chuang et al., 2008). Ohara's theory highlights investors' emotional reactions to market events. If Quadruple Witching Days are perceived as events causing uncertainty or anxiety, investors may be more likely to react emotionally on the event day. This can result in significant price fluctuations only on the event day, while on the days before and after, the market may return to a more stable condition as emotional reactions subside. The SRI-KEHATI index may focus more on stocks with good financial and social responsibility performance (sustainable). Events like Quadruple Witching Days, more related to financial instruments and derivatives, may not have a significant impact on the sustainable stocks that constitute this index. The EMH emphasizes that markets reflect available information. If Quadruple Witching Days are seen as events providing new information or causing uncertainty, their impact may be strongest on the event day. Before and after, this new information may already be reflected in stock prices.

CONCLUSION

Based on the data analysis and discussion, it can be concluded that there is a significant difference in abnormal returns before and after Quadruple Witching Days in the LQ45 stock index. However, there is no significant difference in the SRI-KEHATI stock indices. Investment recommendations for LQ45 include exercising high caution, being prepared for potential rapid buying or selling, and diversifying the portfolio. Meanwhile, SRI-KEHATI investors are advised to adopt a long-term approach and stabilize their portfolios. The limitations of the study include testing on a subset of indices, focusing on abnormal return variables, a limited research period, and constraints on generalizing results for the overall stock market. Suggestions for future research involve more specific studies on sectors or types of companies, adding variables such as Trading Volume and Volatility, extending the research period, and employing mean-adjusted models or market models in calculating abnormal returns.

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