Testing of Lq45 Stock Return in The Interday Variations Model

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Abstract. The purpose of this study is to use a model derived from Kyle (1985) to illustrate the application of the theory of interday variability proposed by Foster and Viswanathan (2008), based on the phenomenon of the day of the week, the four week, and the Rogalsky of stock returns. This review expects to answer research issues by testing the interday variety model methodology through the peculiarity of the day of the week impact, the fourth week impact and the Rogalsky impact on stock returns for the LQ45 shutting file on the IDX in 2017-2021. Hypothesis testing uses the ANOVA statistical method and paired t test. Furthermore, on the off chance that the information isn't regularly dispersed, the Kruskal-Wallis and Wilcoxon tests are utilized. The results of the study prove that the day of the week and week four phenomena occur, while the Rogalsky phenomenon does not occur on the IDX in 2017-2021.

Keywords: Stock Returns, The Day of The Week, Week Four, Rogalsky

1.   Introduction

The capital market is a business opportunity for various long stretch financial instruments that can be traded both commitment and worth. The capital market expects a huge part in the economy, other than that the capital market has two capabilities, specifically as a monetary and monetary capabilitys. To fulfill its economic function, the capital market is able to channel funds from owners of capital to those who need them efficiently and effectively. In addition, the capital market is a place to improve the welfare of capital owners by sharing profits (dividends), namely compensation for the funds invested. The capital market environment is full of uncertainties that lead to investment risks that must be faced by capital market players. Therefore, information is needed to reduce this uncertainty. Investors need to have some information about stock price movements before making decisions in choosing good company stocks. In fact, almost all investments involve uncertainty or risk. Investors do not know exactly what results will be obtained from the investment they make. As a result, investors bear the risk of their investment (Suad Husnan, 1998). Accurate stock valuation can minimize risk for investors in obtaining reasonable profits, considering that investing in stocks in the capital market is quite risky, even though it promises relatively large capital gains. In general, the higher the expected return, the greater the risk.

Walter Bagehot (1971) in a Financial Analysts Journal, which states that investors do not depend or pay attention to transaction costs as in the inventory model approach, but are very dependent on the information obtained by these market players. This article from Bagehot is

very simple in delivery and does not use various kinds of mathematical explanations, such as financial theory which has been circulating full of mathematical models. Bagehot criticizes the inventory model approach which always emphasizes order flow and transaction costs. The role of information is very important that can determine the price of shares in the market. This information-based model uses the theory of adverse selection (unintentional errors/losses). All considerations and calculations have been made so that a decision was made to buy shares, but losses were found because the market reversed direction from the facts when analyzed. It should also be understood that an increasing market means that security prices have increased and investors generally experience profits. Likewise, on the contrary, when the market declines, the price of securities decreases, so that investors experience losses. Meanwhile, financial theory that uses psychology states that investors will not sell their shares if they are still experiencing losses and continue to hold them until they make a profit.

In the stock market there will be asymmetric information. Information that is not symmetrical owned by investors makes investors have a different price than the price of a security in the market. If investors have little (or incomplete) information, the prices presented will be more inaccurate and may result in overpriced securities being priced. Meanwhile, parties with superior information, as previously mentioned, will order securities at more reasonable prices so that the profits obtained are higher than investors with incomplete information. Therefore, stock prices that are formed in the market due to the information obtained and this information may have costs and investors must know to pay them (Copeland and Galai, 1983). Information submitted by companies listed on the stock exchange can be bad information and good information. Good information causes stock prices to increase and may not increase at the time of announcement because it has been obtained previously where this information has been spread to the public. Bad information causes the price of the security to decrease to a certain level and can come back because the latest information comes, causing the price to reverse. Often times, the information that investors get is quite old, but it looks like it was just given, so caution is needed and financial market supervisors need to be very wise and careful in protecting investors who are making small investments. In several tests it was found that there were deviations from the stock market or commonly called market anomalies. According to Alteza (2006), market anomalies are exceptions to a rule or pattern. There are 4 types of anomaly in finance, namely company anomaly, seasonal anomaly, transaction anomaly and accounting anomaly. The most frequently analyzed anomaly of its effect on company stock returns is the seasonal anomaly, namely the day of the week effect, the fourth week effect and the Rogalsky effect.

Encourage and Viswanathan's (2008) research centers around the unfriendly determination model of the protections market with one broker's data and some liquidity dealers which suggests that merchants have more data on Mondays than different days. The examination analyzes interday varieties in volume, determination cost fluctuation and misfortunes and finds that exchanging expenses and cost change difference are most noteworthy on Mondays, and volume is lower than on Tuesdays. This has a greater impact on companies with better public reporting and companies with free trading liquidity. Rogalsky's study proves that on average Mondays in January get a positive return (January effect), while Mondays in other months get a negative return. Several other studies have not proven the January effect in Indonesia, such as research by Agus (2007) and Octavianus (2009) which proves that in January there is no Rogalsky effect. Sri Werastuti's research (2007) states that the Rogalsky effect occurs a lot in April in Indonesia or is commonly known as the April effect. According to Cahyaningdyah (2005), the April effect occurs because of the Regulation of the Capital Market Supervisory Agency No.80/PM/1996 that the annual report must include an auditor's opinion

report must be submitted to the Financial Services Authority (OJK) no later than 120 days after the company's book closing date at the end of year. Iraman and Mahdi's (2006) research on the effects of the days of the week occurs on the Indonesian Stock Exchange. They conclude that the phenomenon of stock returns on trading days is Monday with the lowest return and Tuesday with the highest return. Research by Maria Rita (2009) proves that the phenomenon of the day of the week effect with the highest returns on Wednesdays and the lowest returns on Mondays occurs on the Indonesia Stock Exchange. Meanwhile, research by Octavianus (2009) and Pratiwie (2012) proves that this phenomenon does not occur on the Indonesian Stock Exchange. Research by Iraman and Mahdi (2006) and Pratiwie (2012) proves that the fourth week effect phenomenon produces negative returns on Mondays concentrated in the fourth week of every month on the Indonesia Stock Exchange. While the research by Maria Rita (2009) and Otaviaus (2009) did not occur the fourth week effect phenomenon on the Indonesia Stock Exchange. This research can be formulated into several questions, namely:

a) What is the effect of the day of the week on stock returns on the LQ45 closing price index on the Indonesia Stock Exchange in 2017-2021?
b) What is the effect of the fourth week on stock returns on the LQ45 closing price index on the Indonesia Stock Exchange in 2017-2021?
c) What is Rogalsky's influence on stock returns on the LQ45 closing price index on the Indonesia Stock Exchange in 2017-2021?

Based on the formulation of the questions above, it is expected that investors can determine their attitude and make decisions to invest in accordance with their investment objectives. The framework of thought that underlies this research can be described in Figure 1.
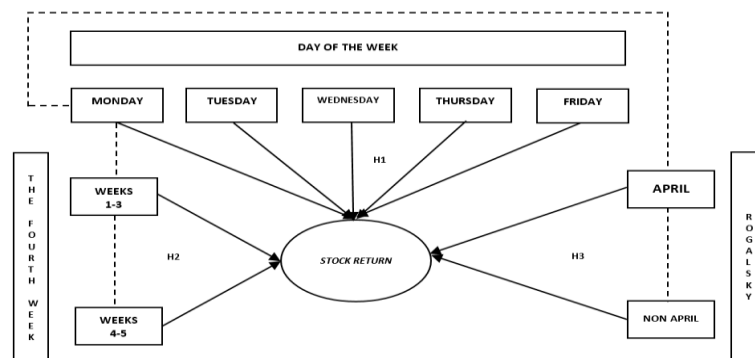

Figure 1. Research Framework

The hypothesis based on Figure 1 can be derived from the research hypothesis as follows:

H1 : There is a day of the week phenomenon on the average LQ5 daily stock return in a week on the Indonesia Stock Exchange in 2017-2021.

H2 : There is a phenomenon in the fourth week of negative daily LQ45 stock returns on the fourth and fifth Monday of every month on the Indonesia Stock Exchange in 2017-2021.

H3 : The Rogalsky phenomenon occurred on the negative daily stock return of LQ45 on Monday April on the Indonesia Stock Exchange in 2017-2021.

2.   Method

Types and wellsprings of information utilized in this study are quantitative information with a testing strategy involving the purposive examining technique as time series information for the LQ45 day to day shutting cost record on the Indonesia Stock Trade in 2017-2021 got from www.finance.yahoo.com and www.idx.co.id. This study uses an event research approach to evaluate market reactions to an event (Jogiyanto, 2018).

The research variables consist of the dependent variable, namely stock returns from the daily stock closing price index, and the independent variables, namely the day of the week, the fourth week and Rogalsky.

Operational definitions in this study are presented in Table 1.

Table 1. Operational Definition of Research

No.	Variable	Definitions and indicators	Formula	Scale
1	*Stock Return (R_{ti})*	*Stock Return* which is a capital gain/capital loss is obtained from the current stock price (P_{ti}) minus the stock price in the previous period ($P_{(t-1)i}$). The stock returns used come from the LQ45 daily closing price index for 2017-2021.	$R_{ti} = \dfrac{P_{ti} - P_{(t-1)i}}{P_{(t-1)i}}$	Ratio
2	*Day of The Week*	*Daily Stock Return* for a week can be calculated based on the average daily stock return for one year. Then the daily stock returns that have been averaged are grouped by day and then tested the hypothesis using the ANOVA analysis method. Furthermore, on the off chance that the information isn't ordinarily conveyed then utilize the Kruskal-Wallis test.	$R_{monday} = \dfrac{IHSI_{monday} - IHSI_{friday}}{IHSI_{friday}}$ $R_{tuesday} = \dfrac{IHSI_{tuesday} - IHSI_{monday}}{IHSI_{monday}}$ $R_{wednesday} = \dfrac{IHSI_{wednesday} - IHSI_{tuesday}}{IHSI_{tuesday}}$ $R_{thursday} = \dfrac{IHSI_{thursday} - IHSI_{wednesday}}{IHSI_{wednesday}}$ $R_{friday} = \dfrac{IHSI_{friday} - IHSI_{thursday}}{IHSI_{thursday}}$	Ratio
3	*The Fourth Week*	*Stock Returns* that occur on Monday are then grouped into two groups, namely early week	$R_{monday\ (week\ 1\text{-}3)} = \dfrac{IHSI_{monday} - IHSI_{friday}}{IHSI_{friday}}$	Ratio

		stock returns (weeks 1-3) and final week (weeks 4-5) stock returns. Then tested the stock return hypothesis which has been grouped into the first week and the last week using the data analysis method, to be specific the matched t test. What's more, on the off chance that the information isn't ordinarily conveyed, then, at that point, the Wilcoxon test is completed.	$R_{monday\ (week\ 4)} = \dfrac{IHSI_{monday} - IHSI_{friday}}{IHSI_{friday}}$	
4	Rogalsky	*Stock Returns* that occur are then grouped into two parts, namely stock returns on Mondays in April and stock returns on Mondays outside of April. Then tested the stock return hypothesis that has been grouped using the analytical method, specifically the matched t-test. Furthermore, in the event that the information isn't ordinarily disseminated, then the Wilcoxson test is utilized.	$R_{monday\ (April)} = \dfrac{IHSI_{monday} - IHSI_{friday}}{IHSI_{friday}}$ $R_{monday\ (non\text{-}April)} = \dfrac{IHSI_{monday} - IHSI_{friday}}{IHSI_{friday}}$	Ratio

3.   Results And Discussion

This research was conducted on the average daily closing price index LQ45 of the Indonesia Stock Exchange in 2017-2021. During the study period, the number of observations was 1,213 daily LQ45 stock transactions for five exchange days (Monday - Friday) and excluding national holidays. Then the daily transaction data for LQ45 shares are regrouped based on the average daily closing price index presented in Figure 2.
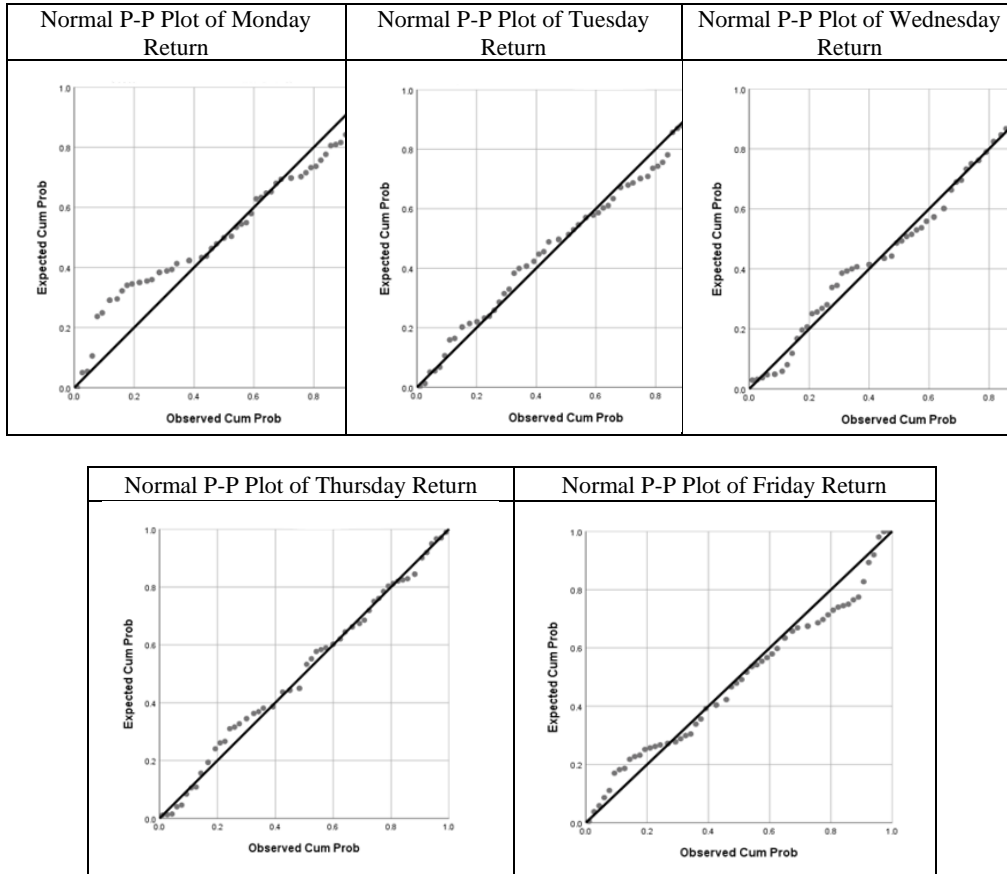
Normal P-P Plot of Monday Return	Normal P-P Plot of Tuesday Return	Normal P-P Plot of Wednesday Return

Normal P-P Plot of Thursday Return	Normal P-P Plot of Friday Return

Figure 2. Stock Returns Based on Trading Days

This study uses stock return variables based on interday variation testing, namely day of the week, fourth week and Rogalsky. After collecting daily stock closing price index data and calculating returns, the data is processed for analysis and then conclusions are drawn to answer the research hypothesis. A description of the average LQ45 daily stock return for 2017-2021 is presented in Table 2.

Table 2. Descriptive Analysis Results

	N	*Min*	*Max*	*Mean*	*Std. Dev*
Monday	60	-.0468	.0107	-.002372	.0078617
Tuesday	60	-.0140	.0147	-.000560	.0048487
Wednesday	60	-.0109	.0141	-.000508	.0054879
Thursday	60	-.0149	.0136	-.000710	.0062332
Friday	60	-.0163	.0215	.000133	.0063240

Source: Author Processing Results, 2022

In Table 2 it can be seen that the lowest average daily return occurs on Monday where the average daily return has a negative value of -0.0468. After that, the daily stock return rose significantly to -0.000560 on Tuesday and rose again to -0.000508 on Wednesday. On Thursday, the stock performance fell to -0.000710 and on Friday it rose again to -0.000133. The greatest standard deviation happens on Monday at 0.0078617 which implies that Monday has the most serious gamble contrasted with other exchanging days. The littlest standard deviation happens on Tuesday at 0.0048487 which implies that Tuesday has the littlest gamble contrasted with different days. The greatest and least qualities demonstrate that the most reduced day to day return happens on Monday at - 0.468 and the most elevated day to day return happens on Friday at 0.215. Based on these data, the most negative stock returns occur on Mondays compared to other days. Conversely, most positive stock returns occur on Fridays. This shows a significant difference on other days.
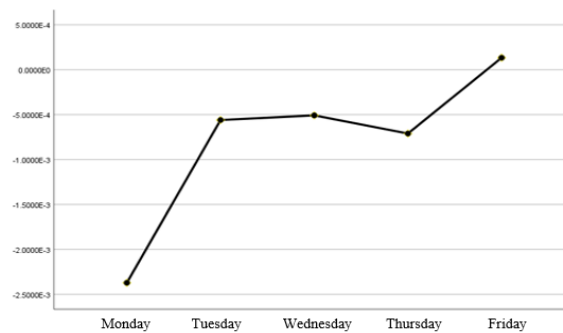

Figure 3. Movement of Average Daily Stock Returns

The movement of the average daily stock returns for five trading days (Monday-Friday) proves that the lowest stock returns occur on Mondays and the highest on Fridays in Figure 3.

Data Normality Test was led to test regardless of whether the information is typically disseminated by utilizing the one example Kolmogorov-Smirnov test. Assuming the importance worth of the one example Kolomogorov-Smirnov test result is $\alpha \geq 0.05$, one might say that the variable is ordinarily appropriated. The results of this test are presented in Table 3.

Table 3. Data Normality Test Results

		Monday	Tuesday	Wednesday	Thursday	Friday
N		60	60	60	60	60
Normal Parameters[a,b]	Mean	-.002372	-.000560	-.000508	-.000710	.000133
	Std. Deviation	.0078617	.0048487	.0054879	.0062332	.0063240
Most Extreme Differences	Absolute	.191	.077	.086	.077	.126
	Positive	.084	.077	.065	.056	.126
	Negative	-.191	-.069	-.086	-.077	-.087
Test Statistic		.191	.077	.086	.077	.126
Asymp. Sig. (2-tailed)		.000[c]	.200[c,d]	.200[c,d]	.200[c,d]	.020[c]

Source: Author Processing Results, 2022

From the test results above, the sample data is not normally distributed because *the asymp value. sig.* < 0.05 then it needs to be tested with nonparametric statistical methods.

The results of the Day of the Week Test namely the phenomenon of differences in daily LQ45 stock returns obtained during five trading days (Monday-Friday) on the Indonesia Stock Exchange in 2017-2021. Based on the first hypothesis, the hypothesis was tested using *the Kruskal-Wallis test*. The results of this test are presented in Table 4.

Table 4. Test Results Days of the Week

	Day	Years	N	Mean Rank		
Return	*Monday*	2017	12	28.63	*Kruskal-Wallis H*	3.433
		2018	12	33.63	*df*	4
		2019	12	23.17	*Asymp. Sig.*	.488
		2020	12	34.46		
		2021	12	32.63		
Return	*Tuesday*	2017	12	32.04	*Kruskal-Wallis H*	8.773
		2018	12	24.13	*df*	4
		2019	12	32.92	*Asymp. Sig.*	.067
		2020	12	40.96		
		2021	12	22.46		
Return	*Wednesday*	2017	12	35.08	*Kruskal-Wallis H*	1.227
		2018	12	27.88	*df*	4
		2019	12	29.17	*Asymp. Sig.*	.874
		2020	12	29.38		
		2021	12	31.00		
Return	*Thursday*	2017	12	27.46	*Kruskal-Wallis H*	4.630
		2018	12	26.96	*df*	4
		2019	12	34.58	*Asymp. Sig.*	.327
		2020	12	25.58		
		2021	12	37.92		
Return	*Friday*	2017	12	29.50	*Kruskal-Wallis H*	6.128
		2018	12	39.08	*df*	4
		2019	12	32.33	*Asymp. Sig.*	.190
		2020	12	29.88		
		2021	12	21.71		
		Total	300			

Source: Author Processing Results, 2022

Table 4 shows that *the asymp. sig* > 0.05 means that H0 is accepted and H1 is rejected. This shows that there is no significant difference in stock returns for the five trading days (Monday-Friday) in 2017-2021. Thus, the first hypothesis of this study was rejected. This means

that trading days will not affect the average daily performance of the LQ45 stock index on the Indonesia Stock Exchange in 2017-2021.

The results of the Fourth Week Test are the LQ45 daily negative stock return phenomenon on Monday the fourth and fifth Sundays of every month on the Indonesia Stock Exchange in 2017-2021. Based on the second hypothesis, the hypothesis testing was carried out using *the Wilcoxon test*. The results of this test are presented in Table 5.

Table 5. Fourth Week Test Results

		N	Mean Rank	Sum of Ranks
Early Week – Week End	*Negative Ranks*	53[a]	30.58	1620.50
	Positive Ranks	7[b]	29.93	209.50
	Ties	0[c]		
	Total	60		
Z		-5.194[b]		
Asymp. Sig. (2-tailed)		.000		
Keterangan : a. *Early Week < Week End* b. *Early Week > Week End* c. *Early Week = Week End*				

Source: Author Processing Results, 2022

From Table 5 above it can be seen that *asymp. sig.* 0.000 < 0.05 which means H0 is rejected. The average stock return generated is seen from Monday to the end of the month (fourth week) with a negative value of 30.58 in 53 of the 60 samples for the 2017-2021 period. Thus the second hypothesis of this study can be accepted, which means that the fourth week effect will affect the average LQ45 index stock return on the Indonesia Stock Exchange in 2017-2021.

The results of the Rogalsky Test are that there is a phenomenon of negative daily stock returns LQ45 on Mondays in April on the Indonesia Stock Exchange in 2017-2021. Based on the third hypothesis, the hypothesis testing was carried out using *the Wilcoxon test*. The results of this test are presented in Table 6 below.

Table 6. Rogalsky Test Results

		N	Mean Rank	Sum of Ranks
Non April - April	*Negative Ranks*	3[a]	2.67	8.00
	Positive Ranks	2[b]	3.50	7.00
	Ties	0[c]		
	Total	5		
Z		-.135[b]		
Asymp. Sig. (2-tailed)		.893		

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Keterangan :
a. Non April < April
b. Non April > April
c. Non April = April
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Source: Author Processing Results, 2022

Based on Table 6 that *the asymp. sig.* 1/2 of 0.893 > 0.05 or 0.447 > 0.05, which means H_0 is accepted. In other words, the third hypothesis of the study means that April and non-April returns are significantly negative, so that the Rogalsky effect does not affect the average LQ45 index stock return on the Indonesia Stock Exchange in 2017-2021.

4.   Discussion and Implications

Day of The Week : According to Ambarwati (2009) days of the week is a model of the phenomenon of daily stock returns systematically occurring higher or lower on certain days of the week. The capital market has five trading days, from Monday to Friday. As per Damodaran in Werastuti (2012) there is a huge contrast between returns on Monday and different days. Normally, a negative return happens on Monday, while on different days a positive return is gotten. The difference in average daily stock returns in a week is due to the strategy carried out by investors. The lowest average stock returns occur on Mondays with negative stock returns, because investors usually receive and analyze data on Monday (the start of a trading day) by determining business strategy steps related to comprehensive market information. Thus, the majority of investors postponed buying shares on Monday. In addition, from a psychological point of view, investors do not like Monday because it is the start of the working day so that it can affect the mood during stock trading transactions. As a result, stock trading transactions have an effect that makes stock prices fall when supply increases and is not matched by demand. The increase in average daily stock returns occurred on Tuesday, Wednesday and Friday. It is possible that the majority of investors have implemented strategic steps in investing, namely by observing and analyzing stocks comprehensively before trading transactions to obtain positive returns. The implications of this study are based on the days of the week that investors can buy shares before trading closes on Monday, then sell them again on other days of the week according to the investment principle of "*buy low sell high*".

The Fourth Week : According to Ambarwati (2009), the fourth week is a model of the daily stock return phenomenon that occurs for four weeks in a certain month. This fourth week phenomenon proves that the Monday Effect only occurs on Mondays on the fourth and fifth Sundays of each month. Meanwhile, significant negative Monday returns do not occur or are equal to zero from the first week to the third week. This fourth week phenomenon is influenced by the relationship between liquidity problems and investment in the stock exchange, where stock investment funds are used for liquidity every month. The LQ45 stock index consists of the indexes of the top 45 companies listed on the Indonesia Stock Exchange. The majority of companies sell their shares to meet liquidity needs at the end of the month. The implication of this research is based on the fourth week, namely that investors are not in a hurry to buy shares in large quantities until the last Monday (week 4-5) of each month. The results of this study prove that negative stock returns occur on the fourth and fifth Monday of every month.

Rogalsky : A phenomenon that was first discovered by a researcher named Rogalsky in 1984. In his research, Rogalsky obtained an interesting relationship between the daily effects of a week and the January effect which causes the average negative return to disappear on Mondays in certain months. This phenomenon occurs in the US capital market, where returns in January are higher than in other months (January effect). Meanwhile, other research proves that the January effect phenomenon does not occur on the Indonesia Stock Exchange. This is supported by research by Cahyaningdyah (2010) that returns in April are higher than other months (April Effect). This study proves that Rogalsky does not occur because the average return every month earns significantly negative stock returns in April and non-April, so the Rogalsky peculiarity significantly affects the typical profit from LQ45 file stocks on the Indonesia Stock Trade in 2017-2021. The implications of this study based on the Rogalsky phenomenon are not proven, because there were no positive stock returns in April, but significant negative stock returns. Therefore, it is suggested that investors do not rush to sell shares in April.

Novelty **Research** in this study that testing the interday variation model has the lowest stock return with a negative value on Monday and the highest stock return with a positive value on Friday every week on the phenomenon of the day of the week, resulting in a negative return on Monday in the first week (week 1-3) and a positive return on Monday in the last week (week 4-5) of every month in the fourth week phenomenon and there is a negative stock return on Monday in every month, in other words it does not occur in the Rogalsky phenomenon. Meanwhile, what Foster and Viswanathan (2008) did was use the interday variation model originating from Kyle (1985), which combines single information from traders, market makers competitors and a group of liquidity traders through a period model of trading days that repeats continuously and allows information security to be obtained every day. . The study examined interday variations in volume, selection cost variance and losses and found that trading costs and price change variances were highest on Mondays, and volume was lower than on Tuesdays. This has a stronger impact on companies with better public reporting and for companies with discretionary trading liquidity. Rogalsky's research shows that the average return on Mondays in January is positive (January effect), while returns on Mondays in other months are negative.

5.   Conclusion

In view of the experimental outcomes and conversation above, it tends to be closed as follows:
 (a) The day of the week peculiarity demonstrates that the most reduced negative stock returns happen on Mondays and the most noteworthy positive stock returns happen on Fridays on the LQ45 stock file on the Indonesia Stock Trade in 2017-2021.
 (b) The fourth week phenomenon proves that positive stock returns occur on the last Monday (week 4-5) of every month on the LQ45 stock index on the Indonesia Stock Exchange in 2017-2021.
 (c) The Rogalsky phenomenon proves that negative stock returns occur on Mondays every month, meaning that the Rogalsky phenomenon does not occur in the LQ45 stock index on the Indonesia Stock Exchange in 2017-2021.

Investors should pay more attention to opportunities to obtain more comprehensive internal and external market information before making investment decisions to get maximum profit (capital gain) from the returns on shares traded. The limitations of this study are the research variables used because they only use the daily closing price index variable. It is hoped that future

researchers can combine it with other variables, such as abnormal return variables, daily trading volume and/or bid/ask volume.

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