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Examining the presence of the monday effect on the Indonesian Stock Exchange before and during the Covid-19 pandemic

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Abstract

This study examines the presence of the Monday effect on the Indonesian Stock Exchange before and during the Covid-19 pandemic based on stock return, transaction volume, and trading patterns. This study uses trading day and trading hour as independent variables and daily return, daily total transaction volume, and return 30-minute intervals return within a day as a proxy for daily investor trading patterns as dependent variables. The data used in this study are from the Jakarta Composite Index from 1 July 2017 to 30 November 2022. The analytical methods used in this research is one-way ANOVA and two-way ANOVA. The results of this study demonstrate that day-of-week was not a significant factor in terms of daily return and daily total transaction volume before and during the pandemic. Moreover, there was no Monday effect in daily investor trading patterns before the pandemic. During the pandemic, the Monday effect in daily investor trading patterns was also not present. However, after the change in the trading hour period, the Monday effect was found in the daily investor trading pattern.

Keywords monday effect; return; transaction volume; trading pattern; 30-minute interval

INTRODUCTION

Capital market anomaly is a condition that deviates from the assumption of efficient market theory (Zacks, 2011). One form of market anomaly is the day-of-the-week effect, where returns can be predicted based on trading day (Gayaker et al., 2020). One of the most well-known day-of-the-week effect phenomena is the Monday effect. Monday effect is a condition in which return tends to be lower or negative compared to the other days of the week (Ülkü & Rogers, 2018). The main cause of Monday effect is controversial, as there is no generally accepted explanation by researchers. Kim & Ryu (2022) argue that Monday effect is caused by negative sentiment over the weekend. Meanwhile, Birru (2018) argues that mood plays a role in causing the Monday effect to occur. On the other hand, Monday effect happened due to bad news on the weekend (French, 1980). Other researchers, such as Abraham & Ikenberry (1994) and Venezia & Shapira (2007), argue that the cause of Monday effect is caused by differences in investor transaction patterns.

The existence of Monday effect itself violated the assumption of weak form of efficient market hypothesis, as investors can potentially maximize their returns based on trading patterns — buying stocks on Monday when returns are low and selling them on other days. The presence of Monday effect can be found in various markets, such as Cryptocurrency (Decourt et al. 2019), crude oil (Li et al., 2022), and passion investment (Plastun et al., 2022).

Previous research on Monday effect has shown that the existence of Monday effect is not consistent. Kim & Ryu (2022), Chiah & Zhong (2021), and Birru (2018) argue that the

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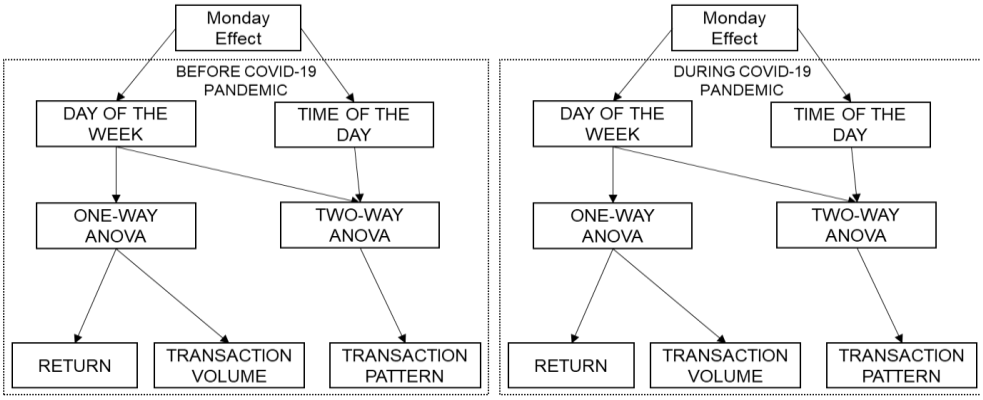

Figure 1.
Theoretical framework model

Monday effect does occur, while Gopinathan (2021) and Noviriani et al. (2018) argue that Monday effect does not occur. During the Covid-19 pandemic, some researchers such as Wiratni et al. (2021) and Bassiouny et al. (2021) found that Monday effect did exist, while some researcher found that there is no Monday effect during the pandemic (Bolek et al., 2022; Kepakisan & Damayanthi, 2021). Most previous research focused on stock returns and transaction volume to find the existence of Monday effect while not examining the existence of Monday effect based on investor trading pattern.

During the Covid-19 pandemic, IDX issue new regulations, such as shortening trading hour, asymmetric auto-reject, and enforcing a trading halt for 30 minutes if the Jakarta Composite Index drops by -5% in a single day. These regulations were made in order to suppress panic among investors during the pandemic. Intervention from regulator might affect the presence of Monday effect on the Indonesian stock exchange.

Based on previous research, no researchers have ever conducted a study about the existence of Monday effect in investor trading pattern before and during the Covid-19 pandemic on the Indonesian Stock Exchange. Furthermore, the data used in this study covers the period from 1 July 2017 to 30 November 2022, where in 2 March 2022 is the date where the Covid-19 case was officially reported for the first time in Indonesia.

This research aims to examine the existence of Monday effect on the Indonesian Stock Exchange (IDX) on stock return, investor trading volume, and investor trading pattern before and during the Covid-19 pandemic. The goals of this study are to: (1) analyze the difference of daily return between Monday and other weekdays before the Covid-19 pandemic. (2) analyze the difference of daily return between Monday and other weekdays during the Covid-19 pandemic. (3) analyze the difference of daily transaction volume between Monday and other weekdays before the Covid-19 pandemic. (4) analyze the difference of daily transaction volume between Monday and other weekdays during the Covid-19 pandemic. (5) analyze the difference of daily investor trading pattern between Monday and other weekdays before the Covid-19 pandemic. (6) analyze the difference of daily investor trading pattern between Monday and other weekdays during the Covid-19 pandemic before the shortening of trading hour period. (7) analyze the difference of daily investor trading pattern between Monday and other weekdays during the Covid-19 pandemic after the shortening of trading hour period.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

This research uses weak form efficiency from efficient market theory (Fama, 1991) as the basis of the research. Weak form efficiency assumes that past information, such as volume, return, and earnings data cannot be used to predict its future direction. Based on

this theory, the Monday effect should not exist as it relies on past information. However, the existence of Monday effect can be tracked long before the development of EMH theory. The Monday effect was found based on finding by Kelly (1930), where stock return in Dow Jones Index tends to be lower than the rest of the day, which violate the assumption of EMH.

Monday effect in daily stock return

Returns on Mondays tend to be negative or lower than other weekdays (Ülkü & Rogers, 2018). The existence of Monday effect in stock return can be found on various stock exchanges. Chiah & Zhong (2021) studied the impact of Mondays on stock returns in Australia. The results of this study indicate that stock returns on Monday are negative while the lowest returns are on Tuesday. The lowest returns on Tuesdays are caused by negative mood spillover from the US stock market. Similarly, Kim & Ryu (2022) found that Monday effect did exist on Korean Stock Exchange, where return on Monday is the lowest and tends to be negative compared to other weekdays.

The existence of Monday effect is affected by the Covid-19 pandemic. During the Covid-19 outbreak, Monday effect reappeared in efficient markets across international markets, such as the United States, Japan, China, Germany, Great Britain, India, France, Italy, Brazil, and Canada (Bassiouny et al., 2022). A reverse Monday effect also can be found in the Swedish market during the pandemic, in which returns on Monday is the highest compared the rest of the day (Bolek et al., 2022).

H1a: There is statistically significant difference in daily stock return between Monday and other weekdays before the Covid-19 pandemic.

H1b: There is statistically significant difference in daily stock return between Monday and other weekdays during the Covid-19 pandemic.

Monday effect in daily transaction volume

The existence of Monday effect in daily transaction volume can be found, where investors tend to trade less on Monday (Batrinca et al. 2018). A study conducted by Bishal B.C. et al. (2014) on the NYSE shows that transaction volume of individual investors on the NYSE on Mondays is lower than on other weekdays. Moreover, institutional investors refrain themselves from trading on Mondays, which caused Monday effect to occur on daily transaction volume (Ülkü & Rogers, 2018). Investors tend to trade less on Mondays because bad earnings news report are often released over the weekend (French, 1980). This causes investors to revise their beliefs about the prospects of the stock (Bishal B.C. et al. 2018). Meanwhile, institutional investors use the beginning of the week to plan for the rest of the week, causing less trading activity on Mondays (Venezia Shapira, 2007).

During the Covid-19 pandemic, total daily transaction volume is lower than before the pandemic due to investor reactions to the pandemic (Kasim et al. 2022). Panics among investor may have affected the existence of Monday effect.

H2a: There is statistically significant difference in daily transaction volume between Monday and other weekdays before the Covid-19 pandemic.

H2b: There is statistically significant difference in daily transaction volume between Monday and other weekdays during the Covid-19 pandemic.

Monday effect in daily investor trading pattern

A study about investor intraday pattern conducted by Bedowka-Sojka (2013) on the Warsaw Stock Exchange shows that investor have U-shape trading pattern. This means that most of the transactions by investors occur during the opening and closing of the market.

Table 1.
Descriptive statistics of daily return before Covid-19 pandemic

	N	Mean	Std. Deviation	Minimum	Maximum
Monday	133	-0.0844%	0.89971%	-3.55%	1.97%
Tuesday	126	0.0012%	0.76311%	-1.96%	2.07%
Wednesday	131	0.0075%	0.82964%	-3.76%	2.31%
Thursday	132	-0.0232%	0.90088%	-2.81%	2.67%
Friday	130	0.0537%	0.69365%	-1.94%	2.33%
Total	652	-0.0095%	0.82105%	-3.76%	2.67%

Source: Secondary data processed, 2023

Investors tend to sell their stock on Monday mornings, mainly at the start of the day compared to the rest of the trading day (Richards & Willows, 2019). This causes the return on Monday morning to be negative, indicating an existence of Monday effect in daily investor trading pattern.

There is a difference in investor trading patterns during the Covid-19 pandemic. A study conducted by Kubiczek & Tuszkiewicz (2022) found that during the Covid-19 pandemic, the number of transactions in the first 5 minutes after market opening are higher compared to the number of transactions before the pandemic. During the Covid-19 pandemic, the Indonesian Stock Exchange shortened the trading hours in order to suppress panic among investors. This policy might have affected investor trading patterns, which in turn might have affected the existence of Monday effect in daily investor trading pattern

H3a: There is statistically significant difference in daily investor trading pattern between Monday and other weekdays before the Covid-19 pandemic.

H3b: There is statistically significant difference in daily investor trading pattern between Monday and other weekdays during the Covid-19 pandemic before the change in trading hour.

H3c: There is statistically significant difference in daily investor trading pattern between Monday and other weekdays during the Covid-19 pandemic after the change in trading hour.

Figure 1 is the theoretical framework model based on the previous research and illustrates the relationship between independent and dependent variables.

METHODS

In order to compare the difference in daily return, daily transaction volume, and investor trading pattern between Monday and other weekdays, this study used two independent variables: trading day to test H1, H2, and H3. The other independent variable is trading hour to test H3. There are also three dependent variables: daily return, daily transaction volume, and 30-minute interval return within a day, which serves as a proxy for daily investor trading patterns.

Sampling

The population used in this study is the Jakarta Composite Index (JCI) for the period of 1 July 2017 to 30 November 2022. The purposive sampling method is used as a sampling technique, with criteria such as population from 1 July 2017 to 30 November 2022, weekdays without holidays on the exchange, and the availability of data on Bloomberg terminal. The data is obtained from Bloomberg Laboratory at Faculty of Economics and Business Diponegoro University.

To test hypotheses H1 and H2, the sample was divided into two subsamples: the first

Table 2.
Descriptive statistics of daily return during Covid-19 pandemic

	N	Mean	Std. Deviation	Minimum	Maximum
Monday	137	-0,1423%	1,41163%	-6,58%	4,07%
Tuesday	139	0,1013%	1,03797%	-4,99%	3,53%
Wednesday	134	0,0496%	0,97075%	-3,18%	2,38%
Thursday	132	0,1164%	1,51665%	-5,20%	10,19%
Friday	128	0,1265%	1,03717%	-2,48%	4,76%
Total	670	0,0489%	1,21631%	-6,58%	10,19%

Source: Secondary data processed, 2023

subsample for the period from 1 July 2017 to 1 March 2020, representing the period before the pandemic and the second subsample for the period from 2 March 2020 to 30 November 2022, representing the period during the pandemic. Meanwhile, to test H3, the sample was divided into three subsamples: the first subsample consisted of data from 1 July 2017 to 1 March 2020, representing the period before the pandemic; the second subsample consisted of data from 2 March 2020 to 27 March 2020, representing the period during the pandemic before the change in trading hours on the IDX, and the third subsample consisted of data from 30 March to 30 November 2022, representing the period during the pandemic after the change in trading hours on the IDX.

Analysis method

The research methods used in this involved descriptive statistics analysis and ANOVA to test the hypotheses. A one-way ANOVA was used to test H1A, H1B, H2A, and H2B. A two-way ANOVA was used to test H3A, H3B, and H3C. If the ANOVA test results were significant, a post hoc was conducted to determine whether the significant differences are found on Monday or not. Prior to conducting the ANOVA test, assumption tests composed of normality and homogeneity of variance tests were conducted first.

The primary tool used for data analysis in this study was IBM Statistical Package for the Social Science (SPSS) 25 software. This software was used to perform various analyses, such as descriptive analysis, outlier detection, assumption test, ANOVA test, and post hoc testing.

RESULTS

Descriptive analysis

Daily return

Descriptive analysis of daily return before and during the pandemic is shown in table 1 and table 2, respectively. Before the pandemic, Monday had the lowest value on average

Table 3.
Descriptive statistics of daily transaction volume before Covid-19 pandemic

	N	Mean	Std. Deviation	Minimum	Maximum
Monday	133	7.435.890.299,19	2.752.914.957,369	2.952.188.928	14.641.375.232
Tuesday	126	7.843.237.367,87	2.716.410.798,088	3.366.632.448	14.849.213.440
Wednesday	131	7.870.045.107,79	2.765.519.214,457	2.925.676.288	17.920.135.168
Thursday	132	7.939.589.856,97	2.837.000.057,435	3.317.164.032	16.395.571.200
Friday	130	7.481.685.060,92	2.820.633.386,653	2.813.614.080	15.134.614.528
Total	652	7.712.948.077,15	2.778.836.568,017	2.813.614.080	17.920.135.168

Source: Secondary data processed, 2023

Table 4.
Descriptive statistics of daily transaction volume during Covid-19 pandemic

	N	Mean	Std. Deviation	Minimum	Maximum
Monday	137	16.398.287.780,44	6.759.128.417,905	2.761.206.272	33.783.920.640
Tuesday	139	16.753.859.801,32	6.899.941.661,001	3.066.200.064	34.552.147.968
Wednesday	134	16.653.403.093,97	6.882.407.469,359	3.864.275.712	34.294.724.608
Thursday	132	16.982.153.596,12	6.882.897.264,649	2.638.365.440	34.470.313.984
Friday	128	16.514.204.242,00	6.413.852.467,208	3.243.080.448	35.018.797.056
Total	670	16.660.254.284,42	6.756.577.800,688	2.638.365.440	35.018.797.056

Source: Secondary data processed, 2023

return (-0,0844%) and maximum return (1,97%) compared to other weekdays.

During the pandemic, compared to other weekdays, Monday had the average return with a value of -0,1423%, it is the lowest compared to other weekdays. The negative average return on Monday during the Covid-19 pandemic was the only negative average return among weekdays.

Daily transaction volume

Descriptive analysis of daily transaction volume before and during the pandemic is shown in table 3 and table 4, respectively. Before the pandemic, the lowest average daily transaction volume occurred on Mondays, with a value of 7.435.890.299,19. The highest transaction volume on Mondays before the pandemic was 14.641.375.232, which was also the lowest among other weekdays.

During the Covid-19 pandemic, Monday also had the lowest average transaction volume compared to other weekdays, with a value of 16.398.287.740,44. The highest total transaction volume on Mondays was the lowest compared to other weekdays, with a value of 33.783.920.640.

30-minute interval return

Descriptive analysis of 30-minute interval returns before the pandemic, and during the pandemic before and after the change in trading hour, is shown in table 5, table 6 and table 7, respectively. Before the pandemic, the lowest average 30-minute interval return occurred on Mondays, with a value of -0,0022%. The lowest average return on Monday happened at 10:30, with a value of -0,0292%. 11:30 had the lowest average 30-minute interval return compared to other trading hours with a value of -0,0266%.

During the Covid-19 pandemic before the change in trading hour, Monday had the lowest average 30-minute interval return compared to other weekdays, with a value of -0,3803%. The lowest return on Monday occurred at 09:00, with a return of -2,5631%. Furthermore, compared to other trading hours, the lowest average 30-minute interval return occurred at 09:00 with a value of -1,0240%.

During the Covid-19 pandemic after the change in trading hour, the lowest average 30-minute interval return occurred on Mondays, with a value of -0,0087%. The lowest average return on Monday happened at 09:30, with a value of -0,0578%. Moreover, the lowest average 30-minute interval return occurred at 09:30 was -0,0485%, compared to other trading hours.

Assumption of normality test

To test the normality of distribution of daily return and daily transaction volumes before and during the pandemic, normal p-p plots and histograms were used. Based on the result of normal p-p plots and histograms, the data for daily returns both before and during the pandemic is normally distributed. For the daily transaction volume data, before the pandemic, the histogram is positively skewed with a moderate level of skewness. To address the issue, a square root transformation was used.

Table 5.
Descriptive statistics of 30-minute interval return before Covid-19 pandemic

Trading Day	Trading Hour	Mean	Std. Deviation	N
Monday	09:00	0,0808%	0,56887%	131
	09:30	-0,0098%	0,20474%	132
	10:00	-0,0007%	0,16743%	132
	10:30	-0,0292%	0,10372%	132
	11:00	-0,0205%	0,14993%	132
	11:30	-0,0197%	0,10903%	132
	13:30	-0,0212%	0,14915%	132
	14:00	-0,0100%	0,10913%	132
	14:30	-0,0162%	0,08810%	132
	15:00	-0,0049%	0,11523%	132
	15:30	0,0276%	0,10868%	132
	Total	-0,0022%	0,21530%	1451
Tuesday	09:00	0,0392%	0,46758%	126
	09:30	-0,0274%	0,20500%	126
	10:00	-0,0265%	0,12543%	126
	10:30	-0,0037%	0,15160%	126
	11:00	-0,0103%	0,13592%	126
	11:30	-0,0376%	0,09403%	126
	13:30	-0,0074%	0,18846%	126
	14:00	0,0025%	0,14175%	126
	14:30	-0,0175%	0,11330%	126
	15:00	-0,0123%	0,11143%	126
	15:30	0,0447%	0,09807%	126
	Total	-0,0051%	0,19561%	1386
Wednesday	09:00	0,1037%	0,48276%	131
	09:30	-0,0243%	0,17810%	131
	10:00	-0,0152%	0,13309%	131
	10:30	-0,0222%	0,16005%	131
	11:00	-0,0169%	0,13384%	131
	11:30	-0,0168%	0,11875%	131
	13:30	0,0024%	0,23718%	131
	14:00	-0,0306%	0,16115%	131
	14:30	0,0010%	0,12558%	131
	15:00	-0,0188%	0,17264%	131
	15:30	0,0519%	0,11423%	131
	Total	0,0013%	0,21197%	1441
Thursday	09:00	0,1643%	0,49207%	132
	09:30	-0,0377%	0,19200%	132
	10:00	-0,0280%	0,16777%	132
	10:30	-0,0407%	0,15647%	132
	11:00	-0,0142%	0,12390%	132
	11:30	-0,0328%	0,10342%	132
	13:30	-0,0001%	0,16611%	132
	14:00	-0,0154%	0,14313%	132
	14:30	-0,0056%	0,11854%	132
	15:00	-0,0208%	0,14109%	132
	15:30	0,0319%	0,10334%	132
	Total	0,0001%	0,20915%	1452

Source: Secondary data processed, 2023

However, during the pandemic, the daily transaction volume is normally distributed.

A normal q-q plot and histogram were used to test the normality of 30-minute interval

Table 5 (Cont.).
Descriptive statistics of 30-minute interval return before Covid-19 pandemic

Trading Day	Trading Hour	Mean	Std. Deviation	N
Friday	09:00	0,0396%	0,59618%	130
	09:30	-0,0229%	0,22660%	130
	10:00	-0,0199%	0,16182%	130
	10:30	-0,0108%	0,11427%	130
	11:00	-0,0324%	0,11216%	130
	14:00	0,0425%	0,19535%	130
	14:30	0,0011%	0,11811%	130
	15:00	-0,0007%	0,14805%	130
	15:30	0,0299%	0,16022%	130
	Total	0,0029%	0,24962%	1170
Total	09:00	0,0861%	0,52470%	650
	09:30	-0,0244%	0,20143%	651
	10:00	-0,0180%	0,15227%	651
	10:30	-0,0215%	0,13931%	651
	11:00	-0,0189%	0,13158%	651
	11:30	-0,0266%	0,10684%	521
	13:30	-0,0066%	0,18773%	521
	14:00	-0,0023%	0,15419%	651
	14:30	-0,0074%	0,11337%	651
	15:00	-0,0115%	0,13945%	651
	15:30	0,0371%	0,11906%	651
	Total	-0,0007%	0,21580%	6900

Source: Secondary data processed, 2023

returns before the pandemic and during the pandemic after the change in trading hour. To test the normality of 30-minute interval returns during the pandemic before the change in trading hour, due to limited amount of data available during this period, the Saphiro-Wilk test was used. Based on the result of the Saphiro-Wilk test, the majority of the data was normally distributed, except for the following data: Monday 09:00 with p = 0,027, 11:30 with p = 0,044; Thursday 10:30 with p = 0,008, 14:30 with p = 0,033; and Friday 10:30 with p = 0,050, 11:00 with p = 0,033. However, Tabachnick & Fidell (2007) argues that two-way ANOVA is robust to violations of the assumption of normality test.

Assumption of homogeneity of variance test

Levene's test was used to test the homogeneity of variance. Based on the result of Levene's test, the data for daily return and daily transaction volume for the period of before and during the pandemic satisfied the assumption of homogeneity of variance. However, the data of daily 30-minute interval returns before the pandemic, during the pandemic before the change in trading hours, and during the pandemic after the change in trading hours had p = 0,000, which violates the assumption of homogeneity of variance. Nevertheless, Tabachnick & Fidell (2007) argue that two-way ANOVA is robust to violations of the assumption of homogeneity of variance. But, the result of the Levene's test must be reported.

Hypotheses testing

Daily return

A one-way ANOVA test between the trading days on daily return before the pandemic is shown in table 8. Based on the result, there is no statistically significant difference at p<0,05 in daily return between Monday and other weekdays with F(4,645) = 0,417, p = 0,796). Thus, hypothesis H1A that there is statistically significant difference in daily stock return between Monday and other weekdays before the Covid-19 pandemic was rejected.

Table 9 is the result of one-way ANOVA test between the trading days on daily return

Table 6.
Descriptive statistics of 30-minute interval return during Covid-19 pandemic before the change in trading hour

Time of the Day	Time of the Day	Mean	Std. Deviation	N
Monday	09:00	-2,5631%	2,09721%	4
	09:30	-0,0668%	0,50769%	4
	10:00	0,1112%	0,17551%	4
	s10:30	0,0247%	0,37422%	4
	11:00	-0,1730%	0,10743%	4
	11:30	-0,4898%	0,67634%	4
	13:30	-0,4030%	0,30409%	4
	14:00	-0,3142%	0,29592%	4
	14:30	-0,2055%	0,43789%	4
	15:00	-0,2284%	0,62828%	4
	15:30	0,1242%	0,05954%	4
	Total	-0,3803%	0,97340%	44
Tuesday	09:00	0,3707%	2,44076%	4
	09:30	0,0382%	0,64454%	4
	10:00	-0,6680%	1,04322%	4
	10:30	-0,0451%	0,83486%	4
	11:00	-0,1637%	0,73047%	4
	11:30	0,2204%	0,50946%	4
	13:30	0,0236%	0,30673%	4
	14:00	-0,1147%	0,27148%	4
	14:30	-0,2326%	0,32204%	4
	15:00	-0,0858%	0,46458%	4
	15:30	0,0773%	0,17503%	4
	Total	-0,0527%	0,85263%	44

Source: Secondary data processed, 2023

during the pandemic. Based on the result, there is no statistically significant difference at p<0,05 in daily return between Monday and other weekdays with F(4,655) = 0,527, p = 0,716. Thus, hypothesis H1B that there is statistically significant difference in daily stock return between Monday and other weekdays during the Covid-19 pandemic was rejected.

Daily transaction volume

A one-way ANOVA test between the trading days on daily transaction volume before the pandemic is shown in Table 10. Based on the result, there is no statistically significant difference at p<0,05 in daily return between Monday and other weekdays with F(4,647) = 1,067, p = 0,372). Thus, hypothesis H2A that there is statistically significant difference in daily transaction volume between Monday and other weekdays before the Covid-19 pandemic was rejected.

Table 11 shows the results of the one-way ANOVA test between the trading days on daily transaction volume during the pandemic. Based on the result, there is no statistically significant difference at p<0,05 in daily transaction volume between Monday and other weekdays with F(4,665) = 0,147, p = 0,964. Thus, hypothesis H2B that there is statistically significant difference in daily transaction volume between Monday and other weekdays during the Covid-19 pandemic was rejected.

Daily investor trading pattern

A two-way ANOVA test for trading day and trading hour on 30-minute interval returns before the pandemic shown in Table 12. Based on the results, there is no interaction effect between trading day and trading hour at p<0,05 with F(38,6771) = 1,399 p = 0,053. Furthermore, the main effect of trading day at

Table 6 (Cont.).
Descriptive statistics of 30-minute interval return during Covid-19 pandemic before the change in trading hour

Trading Day	Trading Hour	Mean	Std. Deviation	N
Wednesday	09:00	-0,6533%	1,42010%	3
	09:30	0,8857%	0,70527%	3
	10:00	-0,1184%	0,46459%	3
	10:30	-0,0061%	0,16701%	3
	11:00	-0,0621%	0,09068%	3
	11:30	0,0200%	0,20199%	3
	13:30	-0,7142%	0,84279%	3
	14:00	-0,0560%	0,21035%	3
	14:30	-0,3867%	0,49711%	3
	15:00	-0,1224%	0,31901%	3
	15:30	0,3130%	0,29503%	3
	Total	-0,0819%	0,65645%	33
Thursday	09:00	-0,5344%	4,71850%	4
	09:30	-0,0173%	0,50920%	4
	10:00	0,1692%	0,20989%	4
	10:30	0,1683%	0,65598%	4
	11:00	0,4138%	0,86425%	4
	11:30	0,0936%	0,59655%	4
	13:30	-0,2350%	0,30984%	4
	14:00	0,1085%	0,32549%	4
	14:30	-0,0990%	0,28505%	4
	15:00	-0,0705%	0,42242%	4
	15:30	0,0704%	0,16964%	4
	Total	0,0061%	1,33128%	44
Friday	09:00	-1,6472%	4,32362%	4
	09:30	0,6386%	0,55428%	4
	10:00	0,1011%	0,45053%	4
	10:30	0,1349%	0,35868%	4
	11:00	0,3861%	0,70041%	4
	14:00	0,8584%	2,56800%	4
	14:30	0,2557%	1,43801%	4
	15:00	0,4160%	0,62664%	4
	15:30	-0,0486%	0,77515%	4
	Total	0,1217%	1,73213%	36
Total	09:00	-1,0240%	3,14602%	19
	09:30	0,2646%	0,64088%	19
	10:00	-0,0790%	0,59829%	19
	10:30	0,0586%	0,49303%	19
	11:00	0,0877%	0,61182%	19
	11:30	-0,0429%	0,56460%	15
	13:30	-0,3067%	0,48258%	15
	14:00	0,1044%	1,15273%	19
	14:30	-0,1203%	0,69473%	19
	15:00	-0,0127%	0,51320%	19
	15:30	0,0964%	0,36497%	19
	Total	-0,0851%	1,16790%	201

Source: Secondary data processed, 2023

$p<0,05$ is statistically not significant with $F(4,6771) = 0,443$, $p = 0,777$. Thus, hypothesis H3A that there is statistically significant difference in daily investor trading

Table 7.
Descriptive statistics of 30-minute interval return during Covid-19 pandemic after the change in trading hour

Trading Day	Trading Hour	Mean	Std. Deviation	N
Monday	09:00	-0,0210%	0,83117%	184
	09:30	-0,0578%	0,30479%	184
	10:00	-0,0537%	0,24104%	184
	10:30	0,0245%	0,15566%	184
	11:00	-0,0274%	0,16030%	184
	13:30	-0,0205%	0,35512%	184
	14:00	0,0157%	0,22320%	184
	14:30	0,0707%	0,17303%	184
	Total	-0,0087%	0,37174%	1472
Tuesday	09:00	0,2841%	0,68984%	185
	09:30	-0,0999%	0,28136%	185
	10:00	-0,0279%	0,22256%	185
	10:30	-0,0407%	0,18921%	185
	11:00	-0,0464%	0,18070%	185
	13:30	0,0010%	0,28500%	185
	14:00	-0,0042%	0,21274%	185
	14:30	0,0454%	0,21406%	185
	Total	0,0139%	0,34228%	1480
Wednesday	09:00	0,1592%	0,53395%	180
	09:30	-0,0591%	0,30014%	180
	10:00	-0,0819%	0,26013%	180
	10:30	-0,0073%	0,20299%	180
	11:00	-0,0308%	0,18217%	180
	13:30	0,0019%	0,29178%	180
	14:00	0,0003%	0,19531%	180
	14:30	0,0723%	0,19497%	180
	Total	0,0068%	0,29931%	1440
Thursday	09:00	0,1861%	0,64165%	177
	09:30	-0,0204%	0,26323%	177
	10:00	-0,0069%	0,20621%	177
	10:30	-0,0416%	0,23742%	177
	11:00	-0,0145%	0,16242%	177
	13:30	-0,0143%	0,30728%	177
	14:00	-0,0342%	0,19484%	177
	14:30	0,0402%	0,17889%	177
	Total	0,0118%	0,31737%	1416
Thursday	09:00	0,1861%	0,64165%	177
	09:30	-0,0204%	0,26323%	177
	10:00	-0,0069%	0,20621%	177
	10:30	-0,0416%	0,23742%	177
	11:00	-0,0145%	0,16242%	177
	13:30	-0,0143%	0,30728%	177
	14:00	-0,0342%	0,19484%	177
	14:30	0,0402%	0,17889%	177
	Total	0,0118%	0,31737%	1416
Friday	09:00	0,0928%	0,57841%	172
	09:30	-0,0009%	0,23325%	172
	10:00	-0,0392%	0,18602%	172
	10:30	-0,0390%	0,23730%	172
	11:00	-0,0074%	0,15547%	172
	13:30	0,0069%	0,24753%	172
	14:00	0,0086%	0,20042%	172
	14:30	0,0603%	0,20500%	172
	Total	0,0103%	0,28698%	1376

Source: Secondary data processed, 2023

pattern between Monday and other weekdays before the Covid-19 pandemic was rejected. However, the main effect trading hour at $p<0,05$ is statistically significant with $F(10, 6771) = 22,068$, $p = 0,000$. The significant difference between the trading hours indicates

Table 8.
One-way ANOVA for trading days on daily return before Covid-19 pandemic

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1,064	4	,266	,417	,796
Within Groups	411,115	645	,637		
Total	412,178	649			

Source: Secondary data processed, 2023

Table 9.
One-way ANOVA for trading days on daily return during Covid-19 pandemic

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2,088	4	,522	,527	,716
Within Groups	649,127	655	,991		
Total	2,088	4	,522	,527	,716

Source: Secondary data processed, 2023

Table 10.
One-way ANOVA for trading days on daily transaction volume before Covid-19 pandemic

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.027.247.682,419	4	256.811.920,605	1,067	,372
Within Groups	155.764.908.524,971	647	240.749.472,218		
Total	156.792.156.207,390	651			

Source: Secondary data processed, 2023

that there is time of the day effect during this period.

Table 13 is the result of two-way ANOVA test for the trading day and trading hour on 30-minute interval returns during the pandemic before the change in trading hour. Based on the results, there is no interaction effect between trading day and trading hour at $p<0,05$ with $F(38,148) = 0,506$ $p = 0,993$. Moreover, the main effect of trading day at $p<0,05$ is statistically not significant with $F(4,148) = 0,944$, $p = 0,440$. Thus, hypothesis H3B that there is statistically significant difference in daily investor trading pattern between Monday and other weekdays during the Covid-19 pandemic before the change in trading hour was rejected.

The results of two-way ANOVA test for the period of during the pandemic after the change in trading hour are shown in Table 14. Based on the results, there is an interaction effect between trading day and trading hour at $p<0,05$ with $F(28,7087) = 3,991$, $p = 0,000$. Due to the presence of an interaction effect between two independent variables, a simple effect test was conducted. The results of simple effect test are shown in Table 15. Based on these results, there are statistically significant differences in trading day based on trading hour at 09:00 with $F(4,7087) = 20,592$, $p = 0,000$ and at 09:30 with $F(4,7087) = 3,263$, $p = 0,000$. To determine whether these significant differences are caused by Monday, post-hoc test was conducted.

Table 16 is the result of post-hoc test for trading day based on trading hour on 30-minute interval returns during the pandemic after the change in trading hour. Based on the results of the post-hoc test, there are statistically difference at $p<0,025$ in return between Monday and other weekdays except Friday at 09:00 with $p = 0,000$ and $p = 0,031$. Additionally, the return on Tuesday is statistically different at $p<0,025$ compared to other weekdays with $p = 0,000$ except for Thursday, with $p = 0,008$. On Thursday, there is statistically difference at $p<0,025$ with Friday with $p = 0,000$. Thus, H3C that there is statistically significant difference in daily investor trading pattern between Monday and other weekdays during the Covid-19 pandemic before the change in trading hour

Table 11.
One-way ANOVA for trading days on daily transaction volume during Covid-19 pandemic

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	27.034.079.074.035.327.000	4	6.758.519.768.508.831.700	,147	,964
Within Groups	30.513.714.773.774.706.000.000	665	45.885.285.374.097.300.000		
Total	30.540.748.852.848.742.000.000	669			

Source: Secondary data processed, 2023

Table 12.
Two-way ANOVA for trading day and trading hour on 30-minute interval return before Covid-19 pandemic

	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	10,597[a]	52	,204	5,347	,000
Intercept	,007	1	,007	,190	,663
Trading_Day * Trading_Hour	2,026	38	,053	1,399	,053
Trading_Day	,068	4	,017	,443	,777
Trading_Hour	8,411	10	,841	22,068	,000
Error	258,065	6771	,038		
Total	268,678	6824			
Corrected Total	268,662	6823			

a. R Squared = ,039 (Adjusted R Squared = ,032)
Source: Secondary data processed, 2023

Table 13.
Two-way ANOVA for trading day and trading hour on 30-minute interval return during Covid-19 pandemic before the change in trading hour

	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	55,988[a]	52	1,077	,735	,899
Intercept	1,270	1	1,270	,867	,353
Trading_Day * Trading_Hour	28,183	38	,742	,506	,992
Trading_Day	5,534	4	1,383	,944	,440
Trading_Hour	21,626	10	2,163	1,476	,154
Error	216,811	148	1,465		
Total	274,254	201			
Corrected Total	272,798	200			

a. R Squared = ,205 (Adjusted R Squared = -,074)
Source: Secondary data processed, 2023

was accepted. Interestingly, the mean difference of return on Tuesday at 09:00 is the highest compared to other weekdays. At 09:30, significant differences were found between Tuesday and Thursday, and Tuesday and Friday with p = 0,009 and 0,001 respectively.

DISCUSSION

The study found that Monday effect is present in daily investor trading pattern during the pandemic after the change in trading hour. Investor pattern on Monday during the first 30 minutes of market opening in this period shows a significant negative return compared to other weekdays. This negative return indicates that investors tend to sell their stock

Table 14.
Two-way ANOVA for trading day and trading hour on 30-minute interval return during Covid-19 pandemic after the change in trading hour

	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	38,646[a]	39	,991	11,984	,000
Intercept	,693	1	,693	8,378	,004
Trading_Day * Trading_Hour	9,240	28	,330	3,991	,000
Trading_Day	,181	4	,045	,546	,702
Trading_Hour	29,010	7	4,144	50,120	,000
Error	585,997	7087	,083		
Total	625,326	7127			
Corrected Total	624,644	7126			

a. R Squared = ,062 (Adjusted R Squared = ,057)
Source: Secondary data processed, 2023

rather than buy. This finding is in line with Richards & Willows (2019), where investors tend to sell their stock on Monday morning. One of the reasons investors sell their stock during Monday morning is because of bad news during the weekend (French, 1980). Bad news during the weekend happened because corporate preferred to release bad news during the weekend over the weekdays (Abraham & Ikenberry, 1994). Moreover, investors tend to buy stocks on Tuesday morning, as indicated by the highest mean return difference during the first 30 minute after market opening compared to other weekdays. This finding contrast with Chiah & Zhong (2021), who found that the lowest return occurs on Tuesday. However, before the pandemic and during the pandemic before the change in trading hours, the Monday effect was not observed. These findings are in accord with Gopinathan (2021), who found that there is no Monday effect on investor trading pattern. The presence of Monday effect occurs after IDX issued a regulation to reduce trading hour during the pandemic. The change in trading hours caused a change in investor behavior. The differences in investor behavior are one of the factors that caused Monday effect to occur (Ülkü & Rogers, 2018).

Based on the result, it is found that Monday effect is not present on daily returns before and during the pandemic. This study agrees with Noviriani et al. (2018) and Gopinathan (2021), where there is no Monday effect in daily stock returns. Moreover, the findings of this study are in line with Bolek et al. (2022), who found that the Monday effect is not present in Baltic countries' stock exchange both before and during Covid-19 pandemic. Kim & Ryu (2022) stated that negative sentiment is one of the factors of Monday effect to occur. However, before the pandemic, sentiment was dominated by positive factors over the year, such as stable economic growth in Indonesia and JCI is at its highest point in history before the pandemic in 2017.

Thirdly, the study found that Monday effect is not present in daily transaction volume both before and during Covid-19 pandemic. This study is in line with Sakalasuskas & Kriksciuniene (2007) and Bachtiar (2009) who found no Monday effect in daily volume transaction on the OMX Vilnius Stock Index and the Indonesian Stock Exchange. However, the mean for daily transaction volume during the pandemic is three times larger compared to before the pandemic. During the pandemic, there was an increase in the number of investors in Indonesia. This indicated that during the pandemic, the level of confidence of investors in Indonesia in market performance was high. This positive sentiment can be one of the reasons for the absence of the Monday effect in daily transaction volume during the pandemic. Before the pandemic, there were no major event that caused negative sentiment among investors. This could be a factor that caused the absence of Monday effect. Moreover, the Indonesian Stock Exchange issued a

Table 15.
Simple effect test of trading day based on trading hour on 30-minute interval return during Covid-19 pandemic after the change in trading hour

Trading Hour		Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
09:00	Contrast	6,811	4	1,703	20,592	,000	,011
	Error	585,997	7087	,083			
09:30	Contrast	1,079	4	,270	3,263	,011	,002
	Error	585,997	7087	,083			
10:00	Contrast	,410	4	,102	1,240	,292	,001
	Error	585,997	7087	,083			
10:30	Contrast	,360	4	,090	1,090	,360	,001
	Error	585,997	7087	,083			
11:00	Contrast	,178	4	,044	,538	,708	,000
	Error	585,997	7087	,083			
13:30	Contrast	,129	4	,032	,389	,817	,000
	Error	585,997	7087	,083			
14:00	Contrast	,343	4	,086	1,038	,386	,001
	Error	585,997	7087	,083			
14:30	Contrast	,107	4	,027	,324	,862	,000
	Error	585,997	7087	,083			

Each F tests the simple effects of Hari_Perdagangan within each level combination of the other effects shown. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means

Source: Secondary data processed, 2023

regulation in 2018 to accelerate transaction settlement from T+3 to T+2.

CONCLUSION

Based on the data analysis and discussion in this study, it can be concluded that the Monday effect does not exist in daily return before and during the Covid-19 pandemic. There is no significant difference between trading days in daily return. Furthermore, Monday effect is not present in daily transaction volume before and during the Covid-19 pandemic. The result of the ANOVA test shows that both before and during the pandemic, there is no significant difference between trading days in daily transaction volume. Regarding the existence of the Monday effect in daily investor trading pattern before and during the pandemic, before the pandemic and during the pandemic, before the change in trading hour, shows that Monday effect was not present. However, during the pandemic, after the change in trading hour, Monday effect can be found in daily investor trading patterns. There is significant difference in trading pattern during the first 30 minute after market opening on Monday compared to other weekdays, in which return on Monday is negative while the other weekdays are positive.

There are some limitations in this study. First, the violations of normality and homogeneity of variance test in some observed groups in the 30-minute interval return affect the reliability of result on two-way ANOVA. Second, the asymmetric trading hours on Fridays compared to other weekdays prior to the implementation of trading hour changes during the pandemic on the IDX have resulted in an unbalanced sample size.

Based on the discussion of this study, during the pandemic after the change in trading period, investors are recommended to utilize Monday effect by buying stock during the first 30 minute after market opening on Monday, when the majority of investors sell their stock, causing negative returns during

the market opening. Investors can sell their stocks during the first 30 minute after market opening on Tuesday, when the majority of investors buy stocks, causing high positive return during the market opening.

Future research can use non-parametric tests to examine the presence of Monday effect in daily investor trading patterns in order to overcome the issues with the assumption tests of the two-way ANOVA. Furthermore, it is recommended that future research investigate the impact of the policies implemented by the IDX during the pandemic on investor trading pattern to determine the effects of regulatory interventions on investor trading behavior.

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