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Testing the efficient market hypothesis with Indonesian Islamic Stocks during the Covid-19 pandemic

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Abstract
Purpose: This study aims to identify the phenomenon of overreaction in Islamic stocks during the COVID-19 pandemic and understand how various pieces of information during the pandemic influenced investors to overreact, leading to market inefficiency.
Research Methodology: This study employs two main methods: an event study focusing on the overreaction phenomenon in the Islamic stock market, and cross-sectional regression to analyze the factors that influence it.
Results: Overreaction was observed in the winner's stock portfolio during the announcement of Indonesia's first COVID-19 case. However, during other significant events, such as the National Economic Recovery program issuance, the arrival of the vaccine, and the highest increase in daily positive cases, overreaction was seen in both the winner and loser stock portfolios. Factors such as abnormal returns, information leakage, and company ownership are identified as significant influencers of this overreaction. These factors were found to be negatively related to cumulative abnormal returns post-event, indicating their role in the overreaction phenomenon.
Limitation: This study focuses on the overreaction phenomenon of Shariah stocks in the Jakarta Islamic Index (JII) during the COVID-19 pandemic in 10 selected events from October 1, 2019, to July 23, 2021.
Contribution: This study offers insights into the behavior of Islamic stocks in Indonesia during the pandemic, helping stakeholders understand market inefficiencies during crises.
Keywords: *Islamic stock, efficient market hypothesis, overreaction, event study, cross-sectional regression*
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1. Introduction

The Efficiency Market Hypothesis (EMH) explains that the available information is fully reflected by the price of the stocks traded. Therefore, investors seek as much information as possible to minimize the risk of investing. Fama's theory (Fama, 1970) explains that a stock market is efficient if it reacts quickly and accurately to new information.

Empirically, the efficient market theory does not always apply to the capital market. Khoidah and Wijayanto (2017) and Kiky (2018) find market inefficiencies caused by efficient market anomalies or violations, one of which is extreme abnormal return. Hartono (2017) states that abnormal returns are the difference between the actual and expected returns. Hartono (2017) states that abnormal return is the difference between the actual return and the expected return. where expected return is the estimated return. Overreactions or investor overreactions to unexpected information cause extreme abnormal

returns in the market. Investors usually set prices too high to react to new information considered good or positive. Conversely, investors set prices that are too low to react to negative information.

The market continues to move and tends to adjust to news. The amount of health, economic, social, and political news during the pandemic affected investment decisions, resulting in high market volatility. A crisis and high volatility in the market lead to investor overreaction (Zouaoui, Nouyrigat, & Beer, 2011).

Islamic stocks have distinctive characteristics, in the form of operational arrangements that follow Islamic principles. These operational arrangements are contained in the Fatwa of MUI DSN Number 80 in 2011 and POJK Number 15 in 2015. The regulation explains the stock market mechanism by prohibiting behavior that contains elements of *usury, maysir, dharar, gharar, talaqqi al-rukban, najsy, ghisysy, bai'al-ma'dum, taghyir, risywah, ghabn, tadlis, ikhtikar, immorality*, and injustice. These unique characteristics should have implications for preventing practices that cause the market to become inefficient, such as illegal activities that utilize internal (insider trading) and misleading information. Thus, the Efficiency Market Hypothesis in the Islamic stock market should be fulfilled.

However, Mujadiddah, Achsani, and Irfany (2020) found an efficient market anomaly in the form of an overreaction phenomenon that caused market inefficiency in the winner's stock portfolio in two selected events: the election of Donald Trump as US President and the bombing of Surabaya. Fatima, Rashid, and Khan (2019) found that the volatility of Islamic stocks reacts to a negative shock as a reaction to bad events. Through these studies, it can be concluded that there is still the possibility of an overreaction phenomenon in the stock market, which causes an anomaly in the efficient market.

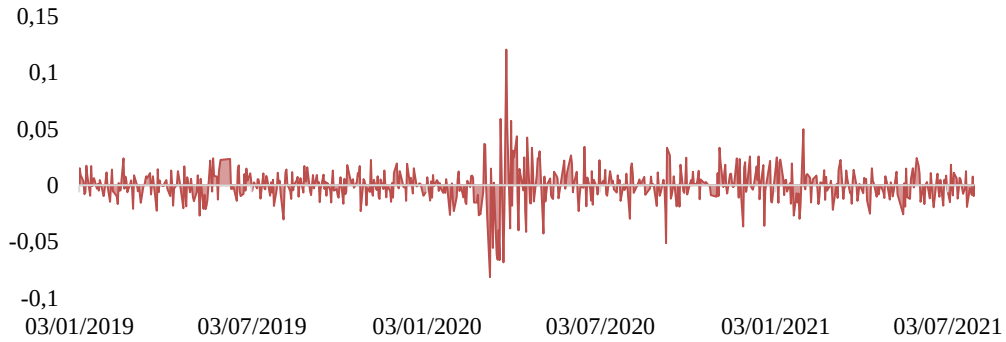

Figure 1. Indonesian daily Islamic stock market returns January 2019-July 2021
Source: *Yahoo Finance* 2021

Figure 1 shows a high fluctuation in returns in the Islamic stock market in Indonesia due to the occurrence of an event. An unexpected event in early March 2020 was the outbreak of COVID-19. The impact of these events extends to the capital markets. The Composite Stock Price Index (JCI) reached its lowest level after receiving information from WHO that the COVID-19 outbreak was declared a global pandemic on March 11, 2020. Figure 1 indicates that the broken line is a marker for confirmation of the first positive case of COVID-19 in Indonesia.

Many studies explain the existence of an efficient market anomaly in the form of an overreaction phenomenon using an event-study approach. For instance, Boubaker, Farag, and Nguyen (2015) found the overreaction phenomenon in the Egyptian stock market by testing the abnormal return of the winner-loser stock portfolio during the trading period of 100 days before and after the event. Another study by Huo and Qiu (2020) explains the occurrence of investor overreaction in response to the announcement of a lockdown in China by examining the reversal of stock returns (reversal) 3 and 40 days after the event occurred. Nevertheless, there is a research gap in the form of few studies discussing the overreaction of Islamic stocks, especially during the COVID-19 pandemic. Therefore, this study aimed to identify the phenomenon of overreaction to events during the COVID-19 pandemic on Islamic stocks incorporated into the Jakarta Islamic Index. In addition, the factors influencing the overreaction phenomenon were analyzed. More specifically, the objectives of this research are as follows: (i) to identify the reaction of Islamic stocks to events during the COVID-19 pandemic; (ii) to identify the

occurrence of an overreaction in Islamic stocks during the COVID-19 pandemic; and (iii) to analyze the factors influencing the overreaction phenomenon in Islamic stocks during the COVID-19 pandemic.

2. Literature Review

A financial market is said to meet the Efficient Market Hypothesis if the stock price can describe all available information, including financial information, companies involved, and even financial market conditions (Van Horne & Wachowicz, 2005). Therefore, information is essential for investors. Investors who can master information earn greater profits than investors who do not master information. This information can be obtained from economic or non-economic sources, either abroad or domestically. Investors analyze and interpret new information in the market through their decisions.

The hypothesis of an efficient market has become a concept in financial markets. However, these phenomena still contradict the efficient market, or are called efficient market anomalies. According to Gumanti and Utami (2002), efficient market anomalies include seasonal, company, event, and accounting. Various anomalies were observed in each category. Dinawan (2007) explains the types of efficient market anomalies in the capital market as follows: (i) price-earning effect, (ii) size effect, (iii) January effect, (iv) neglected firm effect, (v) reversal effect, and (vi) overreaction.

Overreaction is an efficient market anomaly that occurs in the capital market (Dinawan, 2007). The concept of overreaction is inseparable from investors' psychological factors when they respond to new information. Investors will be overconfident about an event, so they set a price that is too high for events or information that is positive (good news) and a price that is too low for events or information that is negative (bad news). Furthermore, the market mechanism corrects overreactions with price reversal. Following De Bondt and Thaler (1985), a market experiences overreaction if the two criteria are met. The criterion is an extreme price movement followed by a reversal of the price movement in the opposite direction. The magnitude of the reversal follows the extremes of the previous stock price movements.

Boubaker et al. (2015) identified overreaction by dividing the portfolio into winners and losers to see the occurrence of a reversal due to investor reactions to an event. The winner stock group provides a high rate of return, whereas the loser stock group provides a low rate of return. Iihara, Kato, and Tokunaga (2004) determine the winner-loser portfolio by dividing by three the total stocks in an index where the upper third of the cumulative abnormal return (CAR) is the winner portfolio, and the lower third is the loser portfolio.

The process of identifying the existence of an overreaction phenomenon involves comparing the average abnormal return data in the period before and after the event using a different test (Boubaker et al., 2015; De Bondt & Thaler, 1985; Mujadiddah et al., 2020). The analysis process is used to observe the existence of extreme abnormal returns, while observing the existence of a reversal using a graph of the average abnormal return (AAR) values of the two periods. Larson and Madura (2003) conducted the first study to analyze the factors that influence overreaction by using the cumulative abnormal return (CAR) variable as the dependent variable because it is considered capable of representing overreaction in the regression model.

2.1. Event Study

Event study is an approach used to analyze the effects of events on an economic market (Kritzman, 1994; Yadav, 1992). In general, event studies often aim to determine market reactions to new information that affect the efficiency market hypothesis. This approach uses the periods before and after the event to identify differences in responses between the two periods. According to research conducted by Tecualu and Megge (2010), the objective of using the event study approach is to measure the market reaction to economic and non-economic events by comparing the relationship between an event and securities companies and security returns.

2.2. Factors Affecting Overreaction

In addition to identifying overreactions, this study also analyzed the factors that influence overreactions. This study uses several variables, including abnormal returns, information leakage, market

capitalization, trading volume, company ownership, and book-to-market ratio (Farag & Cressy, 2010; Huo & Qiu, 2020; Mujadiddah et al., 2020). This can be explained as follows.

Abnormal Returns are the difference between expected and actual returns. Hartono (2003) explains that expected returns can be calculated using three estimation models: mean-adjusted, market-adjusted, and market models. The mean-adjusted model is an estimation model assumes that the expected return has a constant value with the average value of the actual return in the previous period. The market-adjusted model is an estimation model assumes that the expected return value is the same as that of the market index. The market model is an estimation model that measures the expected return value using ordinary least squares regression. Positive abnormal returns make investors interested in transactions because they provide profits above average; however, the opposite situation occurs when the market reacts negatively and produces negative abnormal returns (Wistawan & Widanaputra, 2013). The theory of overreaction suggests that if a reversal follows an extremely abnormal return in the following period, it indicates an overreaction phenomenon (De Bondt & Thaler, 1985).

Leakage of Information is an action that occurs in transactions in the stock market and causes information asymmetry. This asymmetry is a condition in which there is inequality of information circulating in the market and it is only available to specific groups. Larson and Madura (2003) suggest that information leakage causes the overreaction phenomenon. In the Islamic stock market, this information leak indicates that there are transactions prohibited by Islamic principles, namely misleading information and insider trading, which usually occur in short-term stock transactions. This variable is indicated by stocks' cumulative average abnormal returns (CAAR) three days before the event (Boubaker et al., 2015; Farag, 2014). In the same study, Farag (2014) suggests that the greater the leakage of information, the greater the abnormal return that will be generated, so that it can represent the occurrence of higher market inefficiencies.

Market Capitalization is the result of multiplying the price of a share by the number of stocks outstanding in a certain period (Samsul, 2015). The capitalization value varies with changes in company stock prices. According to Nidar and Ulfa (2017), when making investments, investors usually see capitalization value as a consideration for decisions to be taken. Investors feel more confident placing their funds in companies with considerable capitalization value, because large companies tend to be more stable in terms of finances; thus, they have good prospects with lower risks and high profits (Silviyani et al., 2014). Farag and Cressy (2010) find that companies with low capitalization values experience an overreaction compared to companies with high market capitalization values. Huo and Qiu (2020) find that smaller companies are more prone to overreaction.

Trading Volume (TV) is the number of stock transactions in a certain period and is called the trading volume (Sumiyana, 2007). The trading volume is related to stock volatility, as explained in the mixture of distribution theory, which assumes that price changes in each transaction are continuously related to the volume of transactions accompanied by a new flow of information. The trading volume variable is often used as the basis for investors to make decisions, because trading volume is part of a technical analysis (Indarti & Purba, 2011). The existence of a relationship among trading volume, investor decisions, and stock price volatility allows for an overreaction phenomenon that causes extreme price reversals. Cooper (1999) found an overreaction in stocks with high and low volumes. Meanwhile, Hameed and Ting (2000) find that high-volume stocks cause overreactions. Return reversal only occurs in stocks with high volumes compared with stocks with low volumes (Ali, Ahmad, & Anusakumar, 2011).

Company (institutional) ownership is the proportion of stocks owned by the controlling institution or the company. In Rachmad's research (Rachmad, 2013), a company's controlling interests will supervise management performance more optimally. Rachmad (2013) also explains that the advantages of controlling companies' interests include professionalism in analyzing all information, so that they can test constraints on information in a company and implement more substantial supervision of activities within a company. Huo and Qiu (2020) state that the smaller the proportion of company ownership, the

greater the chance of overreacting to stocks, because the percentage of shareholders is dominated by retail or individual investors who tend to overreact to new information.

Book-to-Market Ratio describes the value of a company. This ratio is obtained by comparing a company's book value with its market value (Huo & Qiu, 2020). The lower the book-to-market ratio of a company, the higher is its value in the eyes of investors. Therefore, this ratio is commonly used to measure company performance through market price (Justina, 2017). Justina (2017) explains that there are several reasons why investors use the book-to-market ratio to analyze investment returns, including: (1) book value provides a relatively stable measurement compared to market price; (2) book-to-market ratio is suitable for comparison between companies to determine whether the company is undervalued or overvalued; and (3) companies that have a negative book value are less than companies that have negative earnings, so the book-to-market ratio can be an alternative measure in seeing the value of a company.

2.3. Previous Literature

Farag and Cressy (2010) analyze the factors that can explain the disposition effect in developing-country stock markets on winner-loser stock portfolios. The cross-sectional regression results show that market capitalization and abnormal returns are negatively related to the CAR in the winner stock portfolio. In contrast, company ownership and trading volume have a significant positive relationship with CAR. In contrast to the loser stock portfolio, only market capitalization variables have a negative relationship with CAR, abnormal return variables, company owners have a significantly positive relationship with CAR, and trading volume variables show insignificant results for CAR. Based on the fixed effects panel data method, the significant variables are market capitalization, abnormal returns, and trading volume for the winner and loser stock portfolios.

Boubaker et al. (2015) analyze a short-term overreaction in stock markets in developing countries, employing paired t-test method to identify overreaction and multiple regression models to analyze the determinants of overreaction and see data on daily closing prices of stocks from 2003 to 2010. This study uses an event study approach, as four events were selected as samples: terrorist attacks, tensions in the Middle East, privatization of state-owned enterprises, and the formation of a new government system. The results show that negative news overreacts to the market more than positive news. The factors that significantly affected overreaction were company size, information leakage, and dummy ownership.

Musnadi and Majid (2018) conducted an overreaction and underreaction analysis of sectoral stocks in Indonesia by dividing the observation period into five periods. The sectors studied included mining, agriculture, industrial, basic and chemical, property, real estate, finance, consumer goods, industry, infrastructure, utilities, transportation, and trade. Services and investments. Employing the paired dependent sample t-test method, they find that an overreaction anomaly in the winner's stock portfolio occurs in all sectors tested. The underreaction anomaly was not significantly proven in basic and chemical industries.

Mujadiddah et al. (2020) conducted a short-term overreaction analysis of Indonesia's Islamic stock market and analyzed the factors that influenced it. Two paired sampling and cross-sectional regression methods were used in this study. The dependent variable used to analyze the occurrence of the overreaction phenomenon is cumulative abnormal returns, with the independent variables being abnormal returns, information leakage, trading volume, size, and type of company. The results showed that Donald Trump's election as President of the United States and the terrorist events that occurred in Surabaya experienced overreaction. Meanwhile, the information leakage variable has a significantly negative relationship in the first event, while the company ownership variable has a significantly negative relationship in the second event.

Dilla, Sari, and Achsani (2020) study the effect of the COVID-19 outbreak on sectoral stock returns in Indonesia. The event study approach assesses sectoral stock market performance, represented by the company with the largest market capitalization in each sector. The results showed that the agricultural,

basic industrial, chemicals, infrastructure, utility and transportation, and mining sectors experienced an overreaction during the test period and caused an extremely abnormal return.

Based on the background and flow of the research framework, this study's hypotheses are as follows:

1. Islamic stocks overreacted during the COVID-19 pandemic.
2. Abnormal returns have a significant negative effect on stock returns.
3. Information leakage has a significant positive effect on stock returns.
4. Market capitalization has a significantly negative effect on stock returns.
5. Trading volume has a significantly positive effect on cumulative abnormal stock returns.
6. Company ownership has a significantly negative effect on stock returns.
7. The book-to-market ratio has a significant positive effect on cumulative abnormal stock returns

3. Research Methodology

This study uses secondary data from several official sources, namely the Indonesia Stock Exchange (www.idx.com) and Yahoo Finance (http://finansial.yahoo.com). The data used are the daily closing price or daily data from the closing price of stocks that constitute the Jakarta Islamic Index (JII) and data on each company's financial statements. This study uses the purposive sampling method by selecting stocks that are consistently a constituent of the JII and do not take corporate actions, such as stock splits, dividend distributions, and right offerings, during the study period. Stocks that are JII constituents and have met the criteria of purposive sampling are divided into two stock portfolios based on Musnadi and Majid (2018): the winner and loser stock portfolios.

This study uses an event-study approach to identify the overreaction phenomenon in Islamic stock markets. The event study approach has been widely used to systematically identify the impacts of news or unexpected events. The ten selected samples of events that occurred during the COVID-19 pandemic are listed in Table 2.

Table 2. Sample events during the COVID-19 pandemic

Event	Events	Date of events
Event 1	Announcement of the first positive case of COVID-19 in Indonesia	March 2, 2020
Event 2	Enforcement of PSBB 1 Jakarta	April 10, 2020
Event 3	Issuance of the PEN (National Economic Recovery) program	May 12, 2020
Event 4	Signing the agreement on the supply of the Indonesia-UNICEF COVID-19 vaccine	September 16, 2020
Event 5	Joe Biden's victory speech over the 2020 US election	November 9, 2020
Event 6	The arrival of the COVID-19 vaccine phase 1 in Jakarta	December 6, 2020
Event 7	First vaccination in Indonesia by President Joko Widodo	January 13, 2021
Event 8	Joe Biden's inauguration as US President	January 20, 2021
Event 9	Implementation of the Java-Bali emergency PPKM	July 3, 2021
Event 10	The highest increase in positive cases of COVID-19 as of August 2021	July 15, 2021

Research using an event study approach requires a period of observation to observe the differences before and after the event. The observation period was based on the research of Maneenop and Kotcharin (2020) and Dilla et al. (2020), which was five days before and after the event [-5,+5]. The selection of a short period aims to prevent overlap in each event period owing to the time in the sample events that occur close to each other. The study period also includes an estimated period of 105 days

before the day of the event [-105.0]. The estimation period was used to obtain the expected return value using a market model (Boubaker et al., 2015). The event periods are listed in Table 3.

Table 3. Estimation period and test period

Event	Period of estimation	Test period (before the event)	Test period (after the event)
	t-105	t-5	t+5
Event 1	October 1, 2019	February 24, 2020	March 9, 2020
Event 2	November 8, 2019	April 3, 2020	April 20, 2020
Event 3	December 5, 2019	May 4, 2020	May 19, 2020
Event 4	April 6, 2020	September 9, 2020	September 23, 2020
Event 5	June 4, 2020	November 2, 2020	November 16, 2020
Event 6	July 2, 2020	November 30, 2020	December 15, 2020
Event 7	August 4, 2020	January 6, 2021	January 20, 2021
Event 8	August 11, 2020	January 13, 2021	January 27, 2021
Event 9	January 27, 2021	June 28, 2021	July 12, 2021
Event 10	February 8, 2021	July 8, 2021	July 23, 2021

Sumber: Yahoo Finance

3.1. Methods of analysis

This study was divided into two stages. The first is to determine the indicators of the overreaction phenomenon and the second is to determine the factors that influence the occurrence of overreaction. The analytical steps were based on a study conducted by Boubaker et al. (2015), Musnadi and Majid (2018), and Mujadiddah et al. (2020).

3.2. Determining the category of winner stocks and loser stocks

The category of stocks included in the winner and loser portfolios is determined by examining each stock's cumulative abnormal return (CAR) during the test period before the day of the incident (Farag & Cressy, 2010). In this study, a five-day test period was used before the day of the event (t-5). The CAR values of the stocks are sorted from the largest to the smallest. The ten stocks with the largest CAR value are included in the winner's stock portfolio, while the ten stocks with the lowest CAR value are included in the loser's portfolio. Determining the number of stocks per portfolio is based on a study conducted by Musnadi and Majid (2018); namely, the top third of stocks with the highest CAR and the bottom third are losers. The following are the stages in determining the type of stock category, among others:

First, we determine daily stock returns. The formula for calculating daily returns using the first difference in the natural logarithm (Ln) of the closing price of the ith stock (Boubaker et al., 2015) is as follows:

$$R_{it} = Ln\ P_{it} - Ln\ P_{it-1}$$
$$Rm_t = Ln\ Pm_t - Ln\ P_{mt-1}$$

where

R_{it} = stock *return* of i at period t
P_{it} = stock price of i at period t
P_{it-1} = stock price of i at period t
Rm_t = market return at period t
Pm_t = market index at period t
P_{mt-1} = market index at period t-1

Second, we calculate the abnormal returns. Abnormal return is the difference between actual stock return (R_{it}) and expected stock return (ER_{it}). Expected return is the return expected by investors. The expected returns can be calculated in three ways. However, this study uses a market model estimation model, in which the expected return model is obtained through linear regression (ordinary least squares)

using the resulting alpha and beta values. The determination of the model was based on the study conducted by Boubaker et al. (2015), Maneenop and Kotcharin (2020), and Utama (2021) as follows:

$$ER_{\text{it}} = \alpha_i + \beta_i . R_{mt} + \varepsilon_{it}$$

where:

ER_{it} = *expected return* stock i at period t
α_i = *intercept* of stock i
β_i = *slope coefficient* of stock i
R_{mt} = market based on estimation period
ε_{it} = *residuals*

After obtaining the expected stock return value, we calculate the abnormal return value by calculating the difference between the actual and expected stock returns, as follows:

$$\text{AR}_{\text{it}} = R_{it} - ER_{it}$$

where:

AR_{it} = *abnormal return* of stock i at period t
R_{it} = stock *return stock i at period t*
ER_{it} = *expected return* of stock i in period t

Third, cumulative abnormal return is calculated as the sum of abnormal stock returns during the pre-event period or before the event. The accumulation of abnormal returns in this study is divided into two periods: before the event is used to determine the type of winner and loser stock, and the factors that influence the overreaction phenomenon are as follows:

$$CAR_{it} = \sum_{t=1}^{t} AR_{it}$$

where :

CAR_{it} = *cumulative abnormal return* of stock i at period t
AR_{it} = *abnormal return* of stock i at period t

3.3. Defining overreaction indicator

The research period used was five days before and after the event [-5,+5] to analyze the study's overreaction. This period was selected to prevent an overlap of events (Maneenop & Kotcharin, 2020). Furthermore, the overreaction test is carried out by conducting a different test by comparing the average abnormal return of the stock portfolio (winner and loser) in the period before the day of the incident and after the day of the incident. The following formula is used to calculate the average abnormal return (Musnadi & Majid, 2018):

$$AAR_t = \frac{\sum_{i=1}^{i} AR_{it}}{I}$$

where:

AAR_t = *average abnormal return* at period t
AR_{it} = *abnormal return* stock i at period t
i = number of stock.

3.4. Analysis of factors that influence overreaction

Based on previous research by Farag and Cressy (2010) and Mujadiddah et al. (2020), this study uses a cross-sectional regression analysis model to determine the factors that influence the occurrence of the overreaction phenomenon in Islamic stocks in Indonesia. The research model used was as follows:

$$\text{CAR}_i = \alpha + \beta_1 \text{AR}_{i(0)} + \beta_2 Leak_i + \beta_3 \text{MCap}_i + \beta_4 \text{TV}_i + \beta_5 \text{IO}_i + \beta_6 \text{BM}_i + \varepsilon_i$$

where

CAR_{i} = *cumulative abnormal return* of stock i
$\text{AR}_{i(0)}$ = *abnormal return* of stock i

$Leak_i$	= leaked information of stock i
$MCap_i$	= market capitalization of stock i
TV_i	= trading volume of stock i
IO_i	= institutional ownership of stock i
BM_i	= *book-to-market* of stock i
ε_i	= *residual*s
α	= intercept
$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6$	= estimated parameters.

4. Results and discussion

An important and unexpected event currently experienced by almost all countries is the coronavirus disease (COVID-19) pandemic. This event began with the discovery of Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-COV-2) at the end of 2019 in Wuhan, Hubei Province, China. Lam et al. (2020) explained that the transmission of the virus occurred from human to human. As a result, this virus was endemic and spread massively until the WHO Health Organization declared the COVID-19 pandemic on March 11, 2020.

Economic sectors have also been affected by this virus outbreak. Indonesia experienced a recession due to the economy being corrected for two consecutive quarters (BI, 2021). JCI also decreased and reached its lowest point in the last seven years, namely, Rp. 3,937,517 in March 2020 owing to the rise in negative sentiments. Meanwhile, the JII, representing the condition of the Islamic stock market in Indonesia, also fell.

Figure 4 Movement of the Jakarta Islamic Index February 2020-August 2021
Source: Yahoo Finance (2021)

Figure 2 shows that in early 2021, there was a rebound in the JII stock index, which touched Rp 670.82 on January 20, coinciding with the inauguration of Joe Biden as US President 2020. In addition, other positive sentiments were supported by the seriousness of the Indonesian government in seeking COVID-19 vaccination so that Herd Immunity was reached. Herd immunity, which refers to group immunity, begins by creating individual immunity through natural infection or vaccination (Randolph & Barreiro, 2020).

In early July 2021, there was a decline in the JII stock price index caused by an increase in daily positive cases of COVID-19. The task force dealing with COVID-19 stated that Indonesia had entered the second pandemic wave, with the highest number of daily confirmed positive cases of 56,757 on July 15, 2021. The COVID-19 pandemic has been exacerbated by high levels of community mobility. In this case, the government is trying to suppress the increase in COVID-19 cases with the policy of implementing emergency Community Activity Restrictions (PPKM), which has been implemented since July 3, 2021. This policy was extended four times, until August 2021. This condition reminded investors of the initial state of the pandemic, when the economy was sluggish, resulting in capital outflows and a decline in the stock price index.

4.1. Analysis of Overreaction

This study used ten samples of events that occurred during the COVID-19 pandemic. This study is divided into two periods: the estimation period to determine abnormal returns with the market model, and the test period consisting of the period before the event to form a winner-loser stock portfolio and the period after the event to determine the factors that influence the overreaction. The estimation period is 100 trading days before the test period (t-105), whereas the test period consists of five trading days before the event occurs (t-5) and five trading days after the event occurs (t+5). In each event sample, there are two stock portfolios–winners and losers–to identify a reversal as a characteristic of the overreaction phenomenon.

Testing the overreaction hypothesis uses the value of a stock's average abnormal return (AAR) before and after an event (Mujadiddah et al., 2020). Before testing the overreaction hypothesis, a normality test was performed using the Kolmogorov-Smirnov test. The results indicated that some data were not normally distributed; therefore, the Wilcoxon signed-rank test analysis was used to see the differences in the data before and after the event. To determine the difference in the data before and after the event, a paired dependent sample t-test analysis was used for normally distributed data.

Table 3. The results of the event sample overreaction test

No	Events	Event description	*Asymp.sig*	
			Winner	*Loser*
1	*Event 1*	Announcement of the first positive case of COVID-19 in Indonesia	0.001*	0.479
2	*Event 2*	Enforcement of PSBB 1 Jakarta	0.079	0.116
3	*Event 3*	Issue of PEN (National Economic Recovery) program	0.031*	0.038*
4	*Event 4*	Signing the agreement on the supply of the Indonesia-UNICEF COVID-19 vaccine	0.091	0.637
5	*Event 5*	Joe Biden's victory speech over the 2020 US election	0.5	0.439
6	*Event 6*	The arrival of the COVID-19 vaccine phase 1 in Jakarta	0.043*	0.005*
7	*Event 7*	First vaccination in Indonesia by President Joko Widodo	0.059	0.091
8	*Event 8*	Joe Biden's inauguration as US President	0.19	0.51
9	*Event 9*	Implementation of the Java-Bali emergency PPKM	0.281	0.626
10	*Event 10*	The highest increase in positive cases of COVID-19 as of August 2021	0.026*	0.02*

Source: Yahoo Finance 2021 (data processed)
Description: * significant at 5% significance level

Table 3 shows that the Islamic stock market experienced an overreaction phenomenon in four of the ten selected event samples: Events 1, 3, 6, and 10. Events marked as Event 1 indicate the occurrence of overreaction. This event was the announcement of the first case of COVID-19 in Indonesia on March

2, 2020, by President Joko Widodo. This event received a negative response from investors, which can be explained by the significant results for the winner's stock portfolio at the 95% confidence level. Based on Figure 5, during the 11 days, the movement of abnormal returns of stocks in the winner portfolio reached a minimum point of -1.72%, and the decline was sharper when compared to the loser portfolio on the day when the event occurred. Investors tend to sell stocks in the winning category in response to these events. On the third day after the incident, the winner's stock portfolio experienced a reversal, indicating a reversal and proving an overreaction phenomenon in the winner's Islamic stock portfolio.

In Event 3, the National Economic Recovery (PEN) program issuance also showed significant results in the overreaction test, with Asymp-sig values of 0.031 and 0.038 in the winner and loser stock portfolios, respectively. Figure 6 shows the price decline due to investors' negative reactions to an event's timing. However, after an event, the loser stock portfolio tends to outperform the winner stock, which means that investors respond positively to events. Meanwhile, the winner's stock portfolio shows a decline in returns, caused by negative investor reactions. This difference in movement indicates investor responses to PEN issuance events. In addition to showing significance in both stock portfolios, a return reversal occurred on the fourth day after the event, further strengthening the overreaction hypothesis.

Another event that showed a significant value in the overreaction test was the arrival of the Phase 1 vaccine (Event 6). The overreaction test using the difference test between abnormal returns before and after the event shows significance of 0.043 and 0.005 for the winner and loser stock portfolios, respectively. In addition, Figure 7 shows a reversal of the abnormal return chart on the second day after the event, indicating overreaction between the winner and loser stock portfolios.

The last event that showed the significance of the overreaction test at the 5% significance level was the highest daily increase in COVID-19-positive cases in August 2021 (Event 10). In this event, the winner and loser stock portfolios show significance values of 0.026 and 0.02, respectively. Based on the graph in Figure 8, during the 11-day test period, there was an increase in the return on the loser stock to outperform the winner stock on the third day after the event. The winner's stock portfolio experienced the lowest decline on the third day after the incident. The significance of the two portfolios showed differences in investor reactions to the highest daily increase in COVID-19-positive cases as of August 2021.

Another result that can be explained by the results of the overreaction test in Table 4 is the condition of the Indonesian Islamic stock market, which was inefficient in dealing with various types of information in the form of events that occurred during the COVID-19 pandemic. The overreaction hypothesis testing conducted on ten selected samples showed that four significant events experienced an overreaction. Fama (1970), in his research, explains that the inefficiency of a market indicates that the market is not yet stable because the stock price received by investors does not reflect the available information. DSN MUI Fatwa Number 40 of 2003 explains that the price of Islamic stocks received by investors must be reasonable; that is, it can represent the valuation value of the actual condition, so that there is no overvalued or undervalued. Therefore, the results of the overreaction hypothesis test on Islamic stocks during the COVID-19 pandemic do not follow the Islamic stock theory, which states that Islamic stocks move at stable and fair prices.

Islamic stock markets should be able to achieve these disclosure conditions. Disclosure is a condition in which information can be reflected in stock prices, and investors know the cause of rising and falling prices, both from fundamental and technical aspects. The unstable Islamic stock market allows for speculative transactions such as insider trading or misleading information in Islamic stock trading, which causes investors to overreact to an event. Ali et al. (2011), who explain investor psychology, state that the overreaction phenomenon is caused by a cognitive bias reaction that affects decision-making in trading activities in the stock market. One of the unique characteristics of Islamic stocks is the avoidance of speculative transactions; however, this study shows the possibility of speculative transactions carried out by Islamic stock investors causing overreaction.

The results of the overreaction test in this study are in line with Mujadiddah et al. (2020), who find an overreaction phenomenon in the winner portfolio of Islamic stocks to two important events that occurred in 2016 and 2018. Information leakage was also found to significantly affect overreaction. Information leakage is caused by illegal activities in the financial market that utilize internal information that has not been published for profit, or is called insider trading (Farag & Cressy, 2010). This action is included in the act of *ghabn fahisy* and is prohibited in Islamic share transactions, according to MUI DSN Fatwa Number 80 of 2011.

The speculative transactions and acts of *ghabn fahisy* violate Islamic stock trading activities. Such violations are identical to stock transactions in the short term. Therefore, further testing is required to determine the factors influencing the overreaction phenomenon in Islamic stocks in Indonesia during the COVID-19 pandemic.

4.2. Factors Affecting the Overreaction Phenomenon

Data processing results show that not all events during the COVID-19 pandemic that experienced an overreaction can be explained using the regression model in this study. Only one event can be explained through the regression model in this study: the highest daily increase in COVID-19-positive cases in August 2021 (Event 10). In contrast, the other three identified overreaction events did not significantly affect any variable of the CAR value, which represented the overreaction phenomenon. The analysis of the factors influencing overreaction was only carried out during these events.

The results of the normality test in the event of the highest daily increase in COVID-19-positive cases per August 2021 (Event 10) showed that all variables were contained in the normally distributed model with an Asymp.Sig value greater than 5% significance level. Therefore, all the variables in the model for both events met the assumption of normality. The results of the White test on the model of the highest daily increase in COVID-19 positive cases per August 2021 (Event 10) show that the calculated chi-square value is smaller than the table chi-square value. Therefore, the model in this study inevitably met the classical assumption of heteroscedasticity. The results of the multicollinearity testing Event 10 show that the tolerance value is greater than 0.1, and the VIF value is less than 10; therefore, there is no indication of multicollinearity problems in the two sample events.

After all data meet the Gauss-Markov assumptions, multiple linear regression analysis can be performed. Table 4 shows the estimation results of the linear regression analysis of the loser stock portfolio for Event 10. Statistical testing on Event 10 shows an R-squared value of 0.956, which means that the diversity of the dependent variable cumulative abnormal return (CAR) can be explained by the factors contained in the model at 95.6%. In contrast, the remaining factors were explained by other factors outside the model.

Table 4. The estimated cross-sectional regression of the loser stock portfolio in Event 10

Independent variables	Dependent variable: CARi
	Event 10
C	0.414
	(0.388)
AR	-1.422
	(0.030)*
Leak	-14.351
	(0.008)*
Mcap	-0.002
	(0.866)
TV	0.007
	(0.812)
IO	-0.007
	(0.026)*
BM	0.004
	(0.899)
R-squared	0.956
Adjusted R-squared	0.867
Prob (F-*statistic*)	0.039

Source: Own estimation (2021)
Description: * indicates significance at a 5% significance level

Three variables show significance at the 95% confidence level: abnormal return (AR), information leakage (Leak), and institutional ownership (IO). The abnormal return variable in the loser stock portfolio during the event of the highest daily increase in COVID-19-positive cases in August 2021 (Event 10) was significant. These results indicate that the overreaction phenomenon is influenced by the magnitude of the abnormal returns on an event's occurrence. The coefficient value shown by the abnormal return variable is -1.422, which means that if there is an increase in abnormal return of 1%, the cumulative abnormal return (CAR) in the period after the event occurs will decrease by 142.2%. This evidence demonstrates reversal as an indication of the overreaction phenomenon. These results align with those of Farag (2014) and Boubaker et al. (2015), who show a significant adverse effect on AR on the day the event occurs in a loser's portfolio.

The information leakage variable also indicates a significant negative effect of the information leakage variable on the CAR value, indicating the occurrence of the overreaction phenomenon. The higher the value of the leak, the more complex the overreaction phenomenon, which indicates the existence of information leakage. These results follow the hypothesis built in this study and are in line with previous research by Mujadiddah et al. (2020), which examines the phenomenon of Islamic stock overreaction to the important event of Joe Biden's election as the US president.

The company's ownership in the loser stock portfolio during the event of the highest daily increase in COVID-19 positive cases per August 2021 (Event 10) shows a significance of 0.026 against the overreaction phenomenon with a coefficient of -0.007. These results explain that when there is an increase in the proportion of company ownership by one percent, the overreaction phenomenon seen from the CAR value will decrease by 0.007 percent. These results follow the hypothesis and research by Huo and Qiu (2020), who explain that the overreaction phenomenon occurs in stocks with a small proportion of company ownership, meaning that individual investors play a role in the overreaction phenomenon.

The book-to-market (BM) in the loser stock portfolio when the highest daily positive COVID-19 case increase was in August 2021 (Event 10) showed no effect on the CAR value seen from the magnitude of significance at more than 5 %, which is 0.899. These results do not support the hypothesis built in this study, which states that the book-to-market ratio affects the occurrence of overreaction. This result also contradicts Huo and Qiu's (Huo & Qiu, 2020) study, which found an overreaction in Chinese stocks with a low book-to-market ratio during lockdown announcements. This difference in results is due to the characteristics of investors in the decision to make transactions on stocks differently in each event; therefore, the factors that cause the phenomenon of stock overreaction cannot be determined through this variable.

Furthermore, this research model includes a market capitalization variable that explains the factors influencing overreaction. The stock market capitalization variable describes a company's size by multiplying its stock price by the number of outstanding stocks (listed stocks). The results indicate that the market capitalization variable denoted by MCap has a negative coefficient with a significance level of more than 5%. These results indicate that company size does not affect overreactions. These results indicate a discrepancy with the hypothesis of this study, which states that firm size affects the overreaction phenomenon because the characteristics of the effects of events, types of stocks, and investor psychology are different for each event taken; therefore, the factors that cause the phenomenon of stock overreaction cannot be determined through these variables.

The last variable included in this research model is the TV variable, which compares the stock trading volume when the event occurred (TVt0) to that one day after the event occurred (TVt-1). The estimation results of the linear regression analysis showed that the TV variable had a significance level of more than 5%. This result is inversely proportional to the hypothesis built on this study, which states that there is a significant relationship between trading volume and the overreaction phenomenon. Another study that showed similar results was Mujadiddah et al. (2020), who found that the trading volume of stocks included in a winner's portfolio was not one of the factors that influenced the overreaction phenomenon of the occurrence of an event.

Cross-sectional regression showed that several variables did not affect the occurrence of overreaction. Therefore, the hypothesis proposed in this study could not be tested. Whereas in previous research conducted by Farag (2014), Boubaker et al. (2015), and Huo and Qiu (2020) stated that the variables contained in the model had a significant effect on the occurrence of the overreaction phenomenon because there are differences in the characteristics of the events studied, causing differences in the analysis by investors in responding to events through Islamic stock transactions.

These findings suggest that short-term overreactions have occurred in practicing Islamic stocks in Indonesia during the COVID-19 pandemic. This evidence shows that the Islamic stock market in Indonesia is not sufficiently efficient to receive information about the market. The National Sharia Board of the Indonesian Ulema Council (MUI) Fatwa Number 40 of 2003 explains that transactions in Islamic stocks must be based on prudence and do not contain speculative elements, including insider trading and misleading information. The two transactions are identified through the information leakage variable, which has a significant influence on Islamic stock investors' overreaction. Many sentiments during the pandemic made investors rush to make investment decisions because of the panic over market conditions. Therefore, Islamic stocks are more suitable as investment instruments in the long

term, where investors invest their capital to help the company's operations and gain clear profits, namely, through profits from the profits generated by the company, so Islamic stocks avoid speculative transactions.

5. Conclusion

The COVID-19 pandemic has affected Indonesia's Islamic stock market. Various sentiments due to events during the COVID-19 pandemic have caused investors to react and cause fluctuations in Islamic stock prices. Based on the research results, Islamic stocks in Indonesia have not been sufficiently efficient to deal with the various types of information available during the COVID-19 pandemic. Through different tests, an overreaction phenomenon was found in the two stock portfolios in four sample events, including the winner stock portfolio in the announcement of the first COVID-19 case in Indonesia (Event 1), the winner and loser portfolio in the PEN program issuance event (Event 3), the arrival of the COVID-19 vaccine in Jakarta (Event 6), and the highest daily increase in COVID-19 positive cases per August 2021 (Event 10).

The regression analysis results show that abnormal stock returns when an event occurs, information leakage, and corporate ownership (institutional ownership) significantly negatively affect the cumulative abnormal returns after the event as an indicator of the overreaction phenomenon. Some transactions are prohibited under Islamic principles, namely, misleading information and insider trading, which are identified through information leakage. This evidence does not follow the National Sharia Board of the Indonesian Ulema Council (MUI) Fatwa Number 80 of 2011, which explains the Islamic principles in stock transactions.

Hence, based on this study, several suggestions can be made. First, the COVID-19 pandemic has had an impact in the form of uncertainty; thus, investors overreact to new information. When issuing policies, the government is expected to pay attention to capital market conditions; therefore, there is no multiplier effect in the economic sector. In addition, Islamic stock investors are expected to be able to make wiser investment decisions by receiving new market information to prevent high fluctuations in Islamic stocks.

Second, the National Sharia Board of the Indonesian Ulema Council (MUI) Fatwa Number 80 of 2011 explained that transactions are prohibited from investing in the Islamic stock market, including misleading information and insider trading. These two transactions lead to investor speculation, resulting in an overreaction and market inefficiency. As investors invest in Islamic stocks, more attention must be paid to transactions that follow Islamic principles to avoid transactions that cause market inefficiency and losses in extreme price declines. In addition, investors need to understand the internal and external conditions of stock issuers to make appropriate investment decisions.

Finally, for further research, an overreaction analysis can be carried out on stocks by sector to determine in more detail the occurrence of an efficient market anomaly in the form of overreaction. In addition, research can be conducted by comparing the efficiency of conventional and Islamic stock markets to determine the extent of Islamic stock market efficiency.

References

Ali, R., Ahmad, Z., & Anusakumar, S. V. (2011). STOCK MARKET OVERREACTION AND TRADING VOLUME: EVIDENCE FROM MALAYSIA. *Asian Academy of Management Journal of Accounting & Finance*, 7(2).

BI. (2021). Pertumbuhan Ekonomi Indonesia Triwulan IV 2020 Melanjutkan Perbaikan. Retrieved from https://www.bi.go.id/id/publikasi/ruang-media/news-release/Pages/sp_233321.aspx

Boubaker, S., Farag, H., & Nguyen, D. K. (2015). Short-term overreaction to specific events: Evidence from an emerging market. *Research in International Business and Finance,* 35, 153-165.

Cooper, M. (1999). Filter rules based on price and volume in individual security overreaction. *The review of financial studies*, 12(4), 901-935.

De Bondt, W. F., & Thaler, R. (1985). Does the stock market overreact? *The Journal of Finance*, 40(3), 793-805.

Dilla, S., Sari, L. K., & Achsani, N. A. (2020). Estimating the effect of the covid-19 outbreak events on the indonesia sectoral stock return. *Jurnal Aplikasi Bisnis dan Manajemen (JABM)*, 6(3), 662-662.
Dinawan, M. R. (2007). Analisis Overreaction Hyphothesis, dan Pengaruh Firm Size, Likuiditas dan Bid-Ask Spread terhadap Fenomena Price Reversal di Bursa Efek Jakarta. *Universitas Diponegoro*.
Fama, E. F. (1970). Efficient capital markets: A review of theory and empirical work. *The Journal of Finance*, 25(2), 383-417.
Farag, H. (2014). Investor overreaction and unobservable portfolios: evidence from an emerging market. *Applied Financial Economics*, 24(20), 1313-1322.
Farag, H., & Cressy, R. (2010). Do unobservable factors explain the disposition effect in emerging stock markets? *Applied Financial Economics*, 20(15), 1173-1183.
Fatima, A., Rashid, A., & Khan, A.-u.-Z. (2019). Asymmetric impact of shocks on Islamic stock indices: a cross country analysis. *Journal of Islamic Marketing*, 10(1), 2-86.
Gumanti, T. A., & Utami, E. S. (2002). Bentuk pasar efisiensi dan pengujiannya. *Jurnal Akuntansi Dan Keuangan*, 4(1), 54-68.
Hartono, J. (2003). *Teori Portofolio dan Analisis Investasi*: BPFE.
Hartono, J. (2017). Teori portofolio dan analisis investasi edisi kesebelas. *Yogyakarta: BPFE*, 762.
Huo, X., & Qiu, Z. (2020). How does China's stock market react to the announcement of the COVID-19 pandemic lockdown? *Economic and Political Studies*, 8(4), 436-461.
Iihara, Y., Kato, H. K., & Tokunaga, T. (2004). The winner–loser effect in Japanese stock returns. *Japan and the world economy*, 16(4), 471-485.
Indarti, I., & Purba, D. M. B. (2011). Analisis perbandingan harga saham dan volume perdagangan saham sebelum dan sesudah stock split. *Jurnal Ilmiah Aset*, 13(1), 57-63.
Justina, D. (2017). Pengaruh Firm Size dan Market to Book Ratio terhadap Return Portofolio. *Jurnal Manajemen dan Bisnis Sriwijaya*, 15(2), 138-145.
Khoidah, I., & Wijayanto, A. (2017). Fenomena Anomali Pasar di Bursa Efek Indonesia dan Bursa Efek Singapura. *Management Analysis Journal*, 6(1), 112-122.
Kiky, A. (2018). Kajian empiris teori pasar efisien (efficient market hypothesis) pada Bursa Efek Indonesia. *Jurnal Bina Manajemen*, 6(2), 139-156.
Kritzman, M. P. (1994). What practitioners need to know… about event studies. *Financial Analysts Journal*, 50(6), 17-20.
Lam, H. Y., Lam, T. S., Wong, C. H., Lam, W. H., Leung, C. M. E., Au, K. W. A., . . . Wong, K. H. (2020). The epidemiology of COVID-19 cases and the successful containment strategy in Hong Kong–January to May 2020. *International Journal of Infectious Diseases*, 98, 51-58.
Larson, S. J., & Madura, J. (2003). What drives stock price behavior following extreme one-day returns. *Journal of financial Research*, 26(1), 113-127.
Maneenop, S., & Kotcharin, S. (2020). The impacts of COVID-19 on the global airline industry: An event study approach. *Journal of Air Transport Management*, 89, 101920.
Mujadiddah, S., Achsani, N. A., & Irfany, M. I. (2020). Short-term overreaction of Islamic stocks to specific events in Indonesia. *Journal of Islamic Monetary Economics and Finance*, 6(1), 117-134.
Musnadi, S., & Majid, M. S. A. (2018). Overreaction and underreaction anomalies in the Indonesian stock market: A sectoral analysis. *International Journal of Ethics and Systems*, 34(4), 442-457.
Nidar, S. R., & Ulfa, N. (2017). Overreaction Market Analysis, Dividend Policy, Firm Size, and Seasonality to Price Reversal Phenomena. *Accounting and Finance Review (AFR)*, 2(2), 73-77.
Rachmad, A. A. (2013). Pengaruh Penerapan Corporate Governance Berbasis Karakteristik Manajerial Pada Kinerja Perusahaan Manufaktur. *E-Jurnal Akuntansi*, 2(3), 678-696.
Randolph, H. E., & Barreiro, L. B. (2020). Herd immunity: understanding COVID-19. *Immunity*, 52(5), 737-741.
Samsul, M. (2015). Pasar Modal dan Manajemen Portofolio Edisi 2. *Jakarta: Erlangga*.
Silviyani, N. L. N. T., Edy Sujana, S., Msi, A., ADIPUTRA, I. M. P., SE, S., & Si, M. (2014). Pengaruh likuiditas perdagangan saham dan kapitalisasi pasar terhadap return saham perusahaan yang berada pada indeks LQ45 di Bursa Efek Indonesia periode tahun 2009-2013 (Studi empiris

pada perusahaan LQ45 di Bursa Efek Indonesia). *JIMAT (Jurnal Ilmiah Mahasiswa Akuntansi) Undiksha*, *2*(1).

Sumiyana, S. (2007). Noise Atau Kedatangan Informasi: Sebuah Fenomena Spesifik Perilaku Harga Saham Di Pasar Modal Indonesia Studi Empiris Berbasis Data Intraday, Bursa Efek Jakarta 1999-2006. *Journal of Indonesian Economy and Business (JIEB)*, 22(3), 192-218.

Tecualu, M., & Megge, R. (2010). Reaksi Pasar Modal Indonesia Terhadap Peristiwa Bom Kuningan Tahun 2009. *Jurnal Ilmiah Manajemen Bisnis Ukrida*, 10(1), 97087.

Utama, S. (2021). Islamic Stock Overreaction Phenomenon on Financial Statement: An Event Study. *EkBis: Jurnal Ekonomi dan Bisnis*, 5(1), 24-42.

Van Horne, J. C., & Wachowicz, J. M. (2005). *Fundamentals of financial management*: Pearson education.

Wistawan, A., & Widanaputra, A. (2013). Dampak Pengumuman Pemecahan Saham Pada Perbedaan Abnormal Return. *E-Jurnal Akuntansi Universitas Udayana*, 5(1), 1-16.

Yadav, P. K. (1992). Event studies based on volatility of returns and trading volume: A review. *The British accounting review*, 24(2), 157-184.

Zouaoui, M., Nouyrigat, G., & Beer, F. (2011). How does investor sentiment affect stock market crises? Evidence from panel data. *Financial review*, 46(4), 723-747.