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Comparison of the Environmental, Social, and Governance Stock Index with Sharia Stock Index Performance Before and During the COVID-19 Pandemic in Southeast Asia

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Abstract

COVID-19 is a pandemic event with a global impact from a health and economic point of view. The number of confirmed cases of COVID-19 that continues to grow has caused several countries to implement lockdown policies. However, it has implications for an increasingly depressed stock market. Thus, it can affect the performance of stock indexes in various countries. For this reason, this research aims to examine the effects of the COVID-19 pandemic on the Islamic stock index and the environmental, social, and governance stock index in Southeast Asia and then compare the two indexes when responding to the COVID-19 pandemic. The models used in this research were event study and Vector Error Correction Model (VECM). This study utilized time-series data with a five-month daily period from December 2019 to April 2020. The event study model results showed that the number of positive cases of COVID-19 significantly affected the stock index performance, except for the ESG stock indexes in Singapore. Moreover, the VECM results revealed that the number of positive cases of COVID-19 had a significant effect on the stock index performance in the long and short term, except for the sharia stock index, which did not have a significant impact on the short term in Singapore and did not have a significant impact on the long term in Malaysia, namely the HIJRAH index.

Keywords: COVID-19, Stock Market, Index, Event Study, VECM Model.
JEL Classification: C32, E44, G11, G23.
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I. Introduction

1.1. Background

COVID-19 originated in Wuhan, China, and appeared at the end of December 2019. The COVID-19 outbreak spreads quickly, affecting 213 countries, including Indonesia (Ascarya, 2022). In January 2020, confirmed cases of COVID-19 in multiple parts of the world reached up to 10,000 cases, and 200 people died. Meanwhile, in March 2020, the number of cases jumped even higher to reach 750,000 cases, and 36,000 people died (Bank Indonesia, 2020).

Not only that, but the confirmed cases of COVID-19 in Southeast Asia are also increasing daily. Based on Figure 1, Singapore had the highest number of positive cases compared to other countries in the Southeast Asia Region as of April 25, 2020. It is also known that the COVID-19 cases in Singapore were recorded at 12,693 cases, and the total death was 12 cases. These cases have caused several countries to implement lockdown policies and establish strict health protocols to slow the virus spread rate. However, a series of lockdown policies have hampered economic operations and created a sentiment of fear from the public. As a result, the stock market has become more volatile (Sadiq, Hsu, Zhang, and Chien, 2021), as shown by the declining performance of stock indexes in various countries.

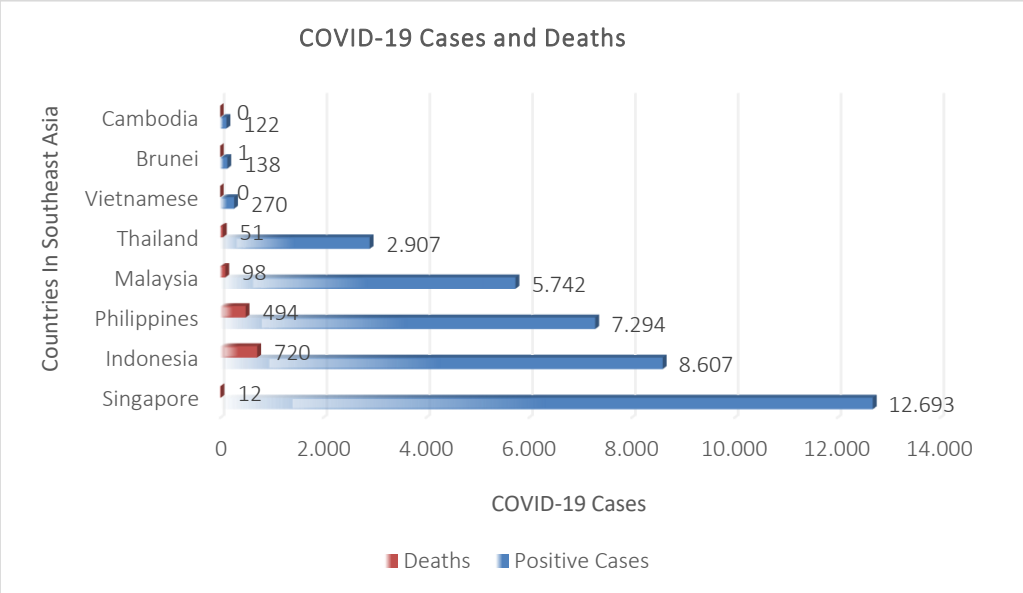

Figure 1. Total positive cases and deaths from COVID-19 in Southeast Asia of April 25, 2020. Source: Our World in Data (2020)

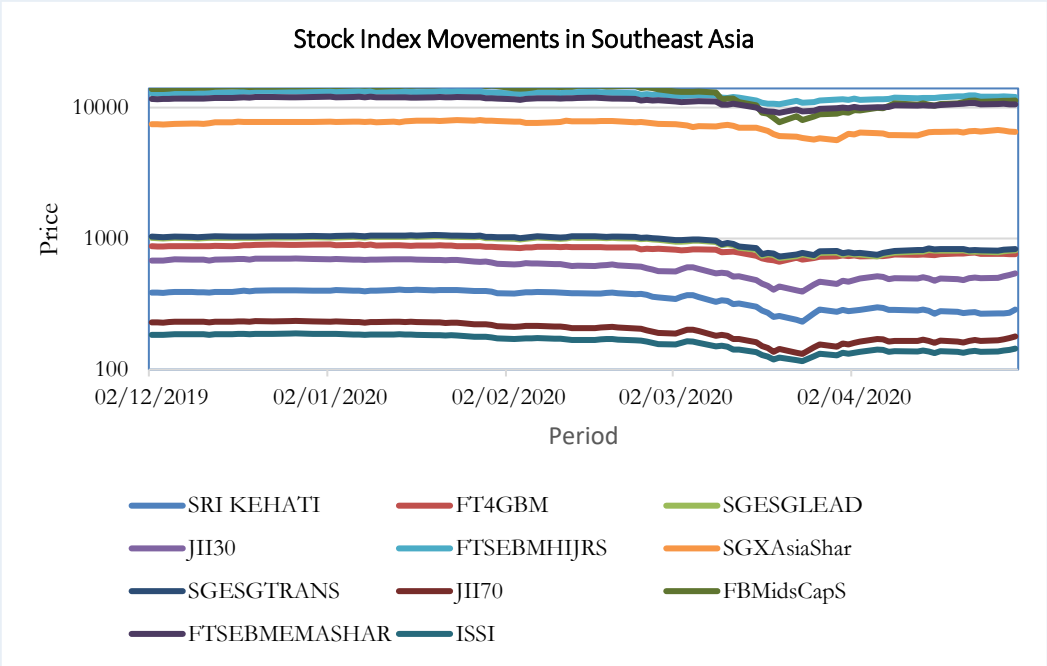

Figure 2. Stock index movements in Southeast Asia from December 21, 2019, to April 30, 2020

Source : National Institute of Health Research and Development (2021)

Figure 2 shows the stock index movement in Southeast Asia, especially the sharia stock index and the ESG index in Indonesia, Malaysia, and Singapore. In the January period, several indexes experienced a decline, such as the Singapore sharia stock index, namely SGXAsiaShar, which reached the level of SGD7,952.70 on January 23, 2020 (European Centre for Disease Prevention and Control [ECDC], 2020). According to Abdullah and Kim (2020), this period was the announcement of the first COVID-19 case in Singapore on January 23, 2020. Thus, it caused a decline in the sharia stock index in Singapore. In the March period, almost all indexes experienced a decline. According to Khatatbeh, Hani, and Abu-Alfoul (2020), during this period, the World Health Organization (WHO) declared COVID-19 a pandemic and the announcement of the first case of COVID-19 in Indonesia (National Institute of Health Research and Development, 2021).

Still shown in Figure 2, according to Bursamalaysia (2021), the sharpest decline in the index was found in the Malaysian stock index, namely FBM Mids Cap Shariah, until it reached the level of MYR7,732.560 on March 19, 2020. Then, the ESG index in Indonesia also experienced a sharp decline, where the SRI-KEHATI index fell to IDR252.83 on March 19, 2020 (Investing, 2020). Therefore, this study wants to dig deeper into how the stock market performance reacted due to the COVID-19 pandemic, considering that the capital market has a crucial role in the country's economy.

Empirically, according to previous research by Liu, Manzoor, Wang, Zhang, and Manzoor (2020), all countries and regions affected by the COVID-19 pandemic experienced significant and negative stock market returns. Then, the confirmed cases of COVID-19 had a significant and detrimental impact on the performance of major Asian stocks on abnormal returns. In addition, according to Khatatbeh et al. (2020), research results showed negative and significant abnormal returns and cumulative abnormal returns when the first cases of COVID-19 appeared in each country, especially after the WHO's announcement.

The results of other studies by He, Sun, Zhang and Li (2020) revealed that the COVID-19 pandemic negatively affected stock prices on the Shanghai Stock Exchange, while the COVID-19 pandemic positively affected stock prices on the Shenzhen Stock Exchange. Meanwhile, according to Ashraf (2020), the stock market responded negatively to the increase in confirmed COVID-19 cases. It means that stock market returns decreased as the number of confirmed cases increased. Then, there was also a negative relationship between growth in the number of deaths due to COVID-19 and stock returns.

Lastly, according to research conducted by Al-Awadhi, Alsaifi, Al-Awadhi, and Alhammadi (2020), the COVID-19 pandemic had a negative relationship with stock market returns. In this case, stock returns were significantly and negatively related to an increase in the number of confirmed positive cases of COVID-19. It was also negatively associated with the increase in the number of deaths due to COVID-19. These results also uncovered a negative effect on all companies included in the Hang Seng index and the Shanghai Stock Exchange.

Thus, the novelty of this study is not only focused on the effect of the COVID-19 pandemic on the stock index through event studies, such as that conducted by Khatatbeh et al. (2020); this study also wants to add a new point, i.e., comparing the environmental, social, and governance stock index performance with sharia stock index and determine whether the impact of the COVID-19 pandemic has a long-term or short-term relationship. Then, the contribution of this research is to improve existing studies, such as those that have been carried out by Liu et al. (2020), Al-Awadhi et al. (2020), Ashraf (2020), Khatatbeh et al. (2020), who examined the impact of COVID-19 on stock markets across countries, and He et al. (2020) in China. Hence, it is hoped that this point of view can provide a new perspective on comparing the performance of the two stock indexes during the COVID-19 pandemic. Therefore, it is important to conduct research entitled "Comparison of the Environmental, Social, and Governance Stock Index with Sharia Stock Index Performance Before and During the COVID-19 Pandemic in Southeast Asia."

II. Literature Review

2.1. Background Theory

A research-based event study by Fama in 1970 can represent the market reaction to specific events. Theoretically, Fama (1970) stated that the market could be efficient when the current stock price describes all available information. The capital market is said to be efficient if the market can respond quickly to obtain a new equilibrium price that thoroughly explains all available information. The faster the news is delivered, which can be seen in the share price, it can be ascertained that the more efficient the capital market. Fama (1970) then categorized the market hypothesis into three forms:

2.1.1 Weak Form

In this market category, stock prices in the capital market represent all information through historical prices. Stock prices and past information influence current stock prices to help obtain current stock prices. Various stock price trends can be obtained through analysis of previous information.

2.1.2 Semi-Strong Form

According to Fama (1991), the market can be categorized as efficient in the semi-strong form if the existing stock prices reflect all past information and significant public information. The market can be said to be efficient when stock prices reflect all published information. Thus, when the information becomes public, all investors will respond quickly, and the price will increase to reflect all the information in the market.

2.1.3 Strong Form

The strong form of the efficient market indicates that the existing price reflects all public or private information. Therefore, the strong form of an efficient market describes all past information, information on the market, and personal information that only certain parties can find, such as the company's management or the board of directors. Through this understanding, it can be shown that the strong-efficient market form is the most restrictive form of the market. Thus, it is by accessing publicly available information and information that only certain parties discover.

2.2. Previous Studies

Qoyum, Sakti, Thaker, and AlHashfi (2021) investigated the influence of Islamic labels on environmental, social, and governance (ESG) performance. Their study found that Islamic companies performed better than non-Islamic

companies in environmental and social issues. Therefore, Islamic companies have taken a good step in integrating Islamic values with ESG factors.

In addition, Al-Awadhi et al. (2020) showed that the COVID-19 pandemic had a negative relationship with stock market returns. The daily growth of COVID-19 cases with death cases had a negative relationship with significant stock returns.

Meanwhile, Lee, Jais, and Chan (2020) revealed that all sectoral indexes and KLCI, except the plantation sector, experienced a negative relationship with COVID-19 cases in Malaysia. It indicates that almost all sector performances in the Malaysian stock market were significantly affected by the COVID-19 outbreak.

Furthermore, Alam, Alam, and Chavali (2020) examined the effect of the lockdown period caused by COVID-19 on the Indian stock market. Their study sought to determine significantly positive abnormal returns in the lockdown period around the date of the event and the speed at which information was absorbed into stock prices. The results of this study uncovered that abnormal returns were positive around the current lockdown period. The research also proves that the lockdown positively impacted the Indian stock market's performance.

Moreover, Ashraf's (2020) results disclosed that the stock market responded negatively to the growth in confirmed cases of COVID-19. When the confirmed cases increased, the stock market returns decreased. Meanwhile, the response to the number of deaths due to COVID-19 was not very strong. Thus, this study showed that the stock market quickly responded to the COVID-19 pandemic, depending on the outbreak's severity.

Meanwhile, Liu et al.'s (2020) study indicated that the COVID-19 outbreak significantly and negatively affected stock market returns in all affected countries and regions. Then, the stock markets of Asian countries responded more quickly to the COVID-19 pandemic. Not only that but confirmed positive cases for COVID-19 had a significant and detrimental effect on the stock index's performance, especially in Asia, which experienced a more significant decline in abnormal returns.

Not only that, Khatatbeh et al.'s (2020) study aimed to explain the direct reaction of stock indexes of countries affected by COVID-19. Using an event study, their research used the abnormal return variable as the measurement variable. The results showed that the global stock market had correctly anticipated the impact of the COVID-19 pandemic, indicated by negative and

significant abnormal returns and cumulative abnormal returns at the time the first case of COVID-19 appeared and after the WHO announcement.

On the other hand, He et al.'s (2020) study investigated the effect of the COVID-19 pandemic on the stock market. The model used was an event study, so the study used abnormal return variables as the measurement variable. The study results revealed that the COVID-19 pandemic negatively impacted stock prices on the Shanghai Stock Exchange, while COVID-19 positively impacted the Shenzhen Stock Exchange.

Moreover, He, Liu, Wang, and Yu's (2020) study aimed to examine the direct effects of COVID-19 on stock markets in eight affected countries. The countries in question were China, Italy, South Korea, France, Spain, Germany, Japan, and the United States. The results of this study stated that overall, COVID-19 had a negative impact on European and American stock markets. However, in this case, COVID-19 had a negative impact but only in the short term on the stock markets in the eight affected countries.

III. Methodology

3.1. Data

Table 1. Sharia stock index and ESG stock index in Southeast Asia

	Indonesia	Malaysia	Singapore
Sharia Stock Index	• JII 30 • JII 70 • ISSI	• FTSE Bursa Malaysia Emas Shariah (EMAS) • FTSE Bursa Malaysia Hijrah Shariah (HIJRAH) • FBM Mids Cap Shariah (MIDSCAP)	• FTSE SGX Asia Shariah 100 Index (SGXSHAR)
ESG Index	• SRI-KEHATI	• FTSE4Good Bursa Malaysia Index (F4GBM)	• iEdge SG ESG Leaders Index (LEADERS) • iEdge SG ESG Transparency Index (TRANS)

Source: Bursamalaysia, (2021); Investing, (2021); SGX, (2021)

This research used time-series data for the daily period from December 2019 to April 2020 to examine the impact of COVID-19 on both ESG and sharia stock indexes in the three selected Southeast Asia countries: Indonesia, Malaysia, and Singapore. This study involved three countries only because, during the research period, these three countries had the highest positive cases of COVID-19 in Southeast Asia. This measure is important because the number of COVID-19 cases was a proxy for the COVID-19 pandemic variable in this study. Quoting from Our World in Data (2020), the third country with the most cases during the research period was the Philippines, with 7,294 cases. However, the Philippines did not yet have an ESG index during the study

period. Thus, the position was replaced by a country in the next order, Malaysia, with 5,742 cases. The stock indexes used in this study are explained in Table 1.

3.2. Model Development

Table 2. Description of variables

Variable	Measure	Source
Dependent Variable		
Cumulative Abnormal Return (CAR)	Percent	investing.com, sgx.com, bursamalaysia.com
Independent Variable		
The Number of the COVID-19 Cases (COVID)	Person	ecdc.europa.eu
Exchange Rate (KURS)	Dollar/Domestic Currency	investing.com
Interest Rate (INT)	Percent	bps.go.id, investing.com, dbs.com
Dow Jones Industrial Average (DJIA)	Price (US$)	investing.com

As explained in Table 2, the variable used in this study consisted of Cumulative Abnormal Return (CAR) to measure the stock index performance as the dependent variable. Then, the primary independent variable was only the number of positive cases of COVID-19 (COVID) as a proxy for the COVID-19 pandemic variable. Meanwhile, the exchange rate (KURS), interest rate (INT), and the Dow Jones Industrial Average (DJIA) variables were actually independent variables. However, in the model, they were only positioned as complementary variables. In addition, following the efficient capital market theory proposed by Fama (1970) and referring to the research conducted by Qoyum et al. (2021), this study proposed the following hypotheses:

Hypothesis 1 = COVID-19 pandemic has a significant relationship to the performance of Islamic stock indexes in Southeast Asia.

Hypothesis 2 = COVID-19 pandemic has a significant relationship to environmental, social, and governance stock index performance in Southeast Asia.

Hypothesis 3 = The sharia stock index performance is better than Southeast Asia's environmental, social, and governance stock index performance during the COVID-19 pandemic.

3.3. Method

This study applied the event study methodology to see the effect of the COVID-19 pandemic on the performance of stock indexes in the three

countries before and during the event. Then, the Vector Error Correction Model (VECM) methodology was employed to measure whether the COVID-19 pandemic had a short-term and long-term impact on the performance of stock indexes. According to He et al. (2020) on the calculation of the event study method, the event window in this research was 30 days before the day of the event (t-30), on the day of the event (t0), and 30 days after the day of the event (t+30). Then, according to Khatatbeh et al. (2020), the analysis began by determining the event date (t0) at the time of the announcement of the first confirmed positive case of COVID-19 in each country. In this study, the day of the event (t0) occurred on March 2, 2020, in Indonesia, January 25, 2020, in Malaysia, and January 23, 2020, in Singapore. Then, the actual returns were identified before calculating the abnormal returns. According to Hartono (2017), the actual return calculation can be done using the following formula:

$$R_{i,t} = \frac{P_{it} - P_{it-1}}{P_{it-1}} \quad (1)$$

Where P_{it} is the stock price i on period t, and P_{it-1} is the stock price of the previous period.

According to Khatatbeh et al. (2020), the abnormal return calculation can use the formula as follows:

$$AR_{it} = R_{it} - E(R_{it}) \quad (2)$$

Where AR_{it} is the abnormal return of stock i on period t; R_{it} is the actual return of stock i on period t; $E(R_{it})$ is the expected return for stock i on period t.

Then, the cumulative abnormal return can be measured by the following formula:

$$CAR_{i(t1,t2)} = \sum_{t2}^{t=t1} AR_{it} \quad (3)$$

$CAR_{i(t1,\ t2)}$ is cumulative abnormal return in stock i on period t, and AR_{it} is abnormal stock return i on period t.

In addition, the Vector Error Correction Model was utilized to find out the effect of COVID-19 on the performance of stock indexes in the long term and short term. According to Nageri, Nageri, and Amin (2015), the research model of VECM used is as follows:

$$\boldsymbol{\Delta} CAR_t = \sum_{i=1}^{n} \beta_1 CAR_{t-1} + \sum_{i=1}^{n} \beta_2 COVID_{t-1} + \sum_{i=1}^{n} \beta_3 INT_{t-1} + \sum_{i=1}^{n} \beta_4 LOG(KURS)_{t-1} + \sum_{i=1}^{n} \beta_5 LOG(DJIA)_{t-1} + \beta_6 ECT_{t-1} + \mu \quad (4)$$

Where $\beta_1,\beta_2,\beta_3,\beta_4,\beta_5,\beta_6$ are the coefficients of each variable; ECT_{t-1} is the error correction term; μ is the residual value.

IV. Results and Analysis

4.1. Results

4.1.1 Descriptive Statistical Results

Table 3. Descriptive statistic

Variable	Mean	Maximum	Minimum	Standard Deviation
		INDONESIA		
CAR_JII30	0.046	0.214	-0.008	0.060
CAR_JII70	0.038	0.187	-0.005	0.051
CAR_ISSI	0.025	0.121	-0.006	0.032
CAR_SRIKEHATI	0.021	0.081	-0.010	0.026
COVID (Person)	63.630	415.000	0.000	115.581
INT (%)	0.047	0.050	0.045	0.002
KURS (Dollar/IDR)	14,501.85	16,575.00	13,572.50	954.78
DJIA ($)	26,210.20	29,551.42	18,591.93	3,089.64
		MALAYSIA		
CAR_EMAS	-0.048	0.002	-0.093	0.030
CAR_HIJRAH	-0.023	0.016	-0.053	0.014
CAR_MIDSCAP	-0.223	0.011	-0.681	0.214
CAR_F4GBM	-0.018	0.004	-0.072	0.020
COVID Person)	40.767	235	0.000	65.079
INT (%)	0.027	0.03	0.025	0.002
KURS (Dollar/MYR)	4.210	4.445	4.055	0.113
DJIA ($)	26,210.20	29,551.42	18,591.93	3,089.64
		SINGAPORE		
CAR_LEADERS	-0.007	0.086	-0.054	0.013
CAR_TRANS	-0.008	0.078	-0.058	0.013
CAR_SGXSHAR	-0.069	0.027	-0.230	0.080
COVID (Person)	110.272	1,426.000	0.000	277.675
INT (%)	0.018	0.020	0.013	0.003
KURS (Dollar/SGD)	1.387	1.459	1.344	0.033
DJIA ($)	26,210.20	29,551.42	18,591.93	3,089.64

The description of descriptive statistics in Table 3 explains the mean, maximum, minimum, and standard deviation values of the data. In general, it can be seen that the CAR_JII30 value was the highest mean value during the study period compared to other indexes at 0.046. Then, positive cases of COVID-19 in Singapore were the most cases reaching 1,426 cases. Moreover, the stock index in Malaysia, CAR_MIDSCAP, had a higher standard deviation than another stock index of 0.214, indicating a higher risk. According to Yong,

Ziaei, and Szulczyk (2021), it can be explained that during the pandemic, stock returns in Malaysia, especially the MIDSCAP index, showed a larger negative slope.

4.1.2 The Event Study Results

Table 4. The Event Study Results in Indonesia

Days	JII30		JII70		ISSI		SRI KEHATI	
	CAR	T-stat	CAR	T-stat	CAR	T-stat	CAR	T-stat
-30	0.004	0.114	0.003	0.083	0.001	0.050	0.003	0.082
-25	0.003	0.102	-0.001	-0.031	-0.003	-0.106	0.014	0.437
-20	0.013	0.457	0.008	0.306	0.002	0.094	0.020	0.700
-15	0.003	0.127	0.004	0.172	0.001	0.066	0.022	0.925
-10	-0.004	-0.195	0.001	0.054	-0.001	-0.070	0.022	1.106
-5	0.007	0.445	0.010	0.707	0.007	0.599	0.023	1.615
0	0.029***	4.432	0.026***	4.308	0.017***	3.251	0.042***	6.711
5	0.054**	3.656	0.046***	3.389	0.030**	2.553	0.046**	3.280
10	0.067***	3.236	0.047**	2.435	0.026*	1.516	0.081***	4.105
15	0.113***	4.418	0.074	3.139	0.055***	2.631	0.061**	2.521
20	0.109***	3.718	0.082***	3.006	0.056**	2.304	0.068**	2.433
25	0.112***	3.411	0.095***	3.121	0.058**	2.151	0.035	1.136
30	0.131**	3.638	0.114***	3.413	0.071**	2.414	0.022	0.630

Descriptions: *= significant at 10%, **= significant at 5%, ***= significant at 1%

Table 4 explains that the stock indexes JII30, JII70, ISSI, and SRIKEHATI had positive and significant CAR values on the first day the COVID-19 case appeared in Indonesia. Then, after the event, the CAR value was significant from +5 days to +30 days. However, the SRIKEHATI index was only significant from day 0 to day +20. It suggests that the market responded positively and profitably when the first case of COVID-19 occurred.

Table 5 shows the results that before the occurrence of positive cases of COVID-19 in Malaysia, the HIJRAH, MIDSCAP, and EMAS indexes showed a negative and significant effect in responding to the COVID-19 pandemic event on day -20 for the EMAS index. Then, the HIJRAH and MIDSCAP indexes also had a negative and significant impact on day -15 until the event occurred. After the positive case of COVID-19 in Malaysia, all these indexes had a negative and significant impact until day +30, except for the F4GBM index, which was only significant on certain days.

Table 6 reveals that the SGXSHAR index had a positive and significant impact on the day the event occurred in the first case of COVID-19 in Singapore. However, it had a negative and significant effect on day +5, +20, until day +30, seen in the negative and significant CAR values. This result was different from

the LEADERS and TRANSPARENCY indexes. The two indexes only decreased at the time before the event and after the event, but not significantly.

Table 5. The event study results in Malaysia

Days	HIJRAH		MIDSCAP		EMAS		F4GBM	
	CAR	T-stat	CAR	T-stat	CAR	T-stat	CAR	T-stat
-30	0.002	0.153	0.001	0.052	0.002	0.136	0.001	0.059
-25	-0.011	-0.710	-0.015	-0.895	-0.015	-0.962	0.002	0.167
-20	-0.018	-1.266	-0.019	-1.268	-0.021*	-1.464	0.002	0.208
-15	-0.021*	-1.681	-0.026**	-1.956	-0.024**	-1.913	0.002	0.223
-10	-0.024**	-2.310	-0.036***	-3.386	-0.026**	-2.546	-0.001	-0.084
-5	-0.028***	-3.931	-0.042***	-5.514	-0.031***	-4.345	-0.002	-0.387
0	-0.020***	-6.369	-0.067***	-19.866	-0.028***	-8.743	-0.008***	-2.878
5	-0.025**	-3.440	-0.119***	-15.747	-0.038***	-5.274	-0.010*	-1.678
10	-0.035***	-3.431	-0.113***	-10.611	-0.045***	-4.487	-0.007	-0.802
15	-0.030**	-2.384	-0.117***	-9.002	-0.041***	-3.337	-0.008	-0.821
20	-0.035**	-2.424	-0.137***	-9.122	-0.049***	-3.451	-0.014	-1.141
25	-0.051***	-3.150	-0.226***	-13.401	-0.070***	-4.433	-0.022*	-1.673
30	-0.053***	-2.977	-0.337***	-18.264	-0.088***	-5.046	-0.032**	-2.169

Descriptions: *= significant at 10%, **= significant at 5%, ***= significant at 1%

Table 6. The event study results in Singapore

Days	SGXSHAR		LEADERS		TRANSPARENCY	
	CAR	T-stat	CAR	T-stat	CAR	T-stat
-30	0.004	0.192	-0.002	-0.061	-0.001	-0.033
-25	0.021	0.965	-0.005	-0.182	-0.003	-0.119
-20	0.012	0.599	-0.004	-0.196	-0.003	-0.144
-15	0.003	0.207	-0.004	-0.202	-0.002	-0.128
-10	0.008	0.622	-0.003	-0.175	-0.002	-0.119
-5	0.009	0.900	-0.004	-0.313	-0.003	-0.255
0	0.010**	2.247	-0.005	-0.882	-0.003	-0.601
5	-0.029**	-2.899	-0.005	-0.474	-0.004	-0.365
10	-0.004	-0.347	-0.011	-0.703	-0.010	-0.619
15	-0.013	-0.794	-0.010	-0.523	-0.009	-0.456
20	-0.046**	-2.320	-0.010	-0.428	-0.008	-0.353
25	-0.091***	-4.080	-0.011	-0.430	-0.009	-0.348
30	-0.071***	-2.931	0.003	0.105	0.001	0.047

Descriptions: *= significant at 10%, **= significant at 5%, ***= significant at 1%

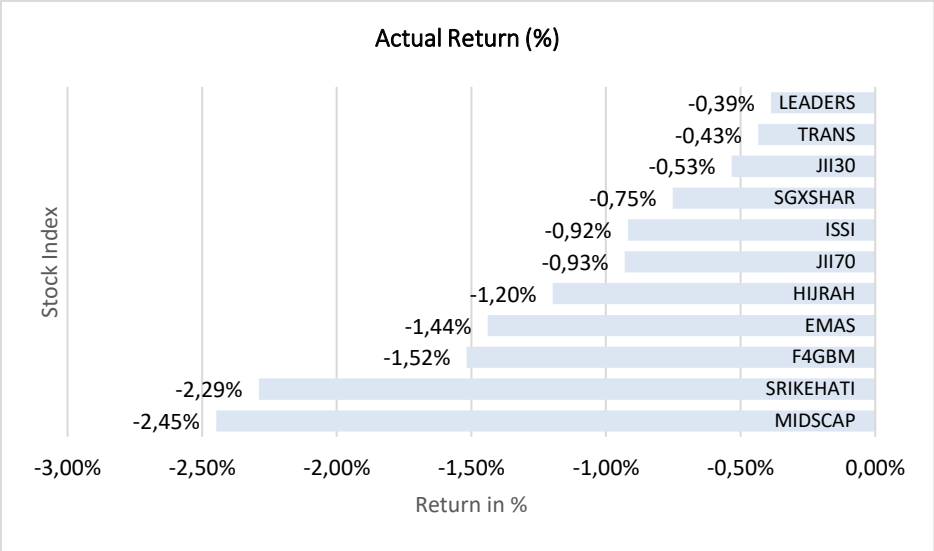

Figure 3. The stock movement index in Indonesia, Malaysia, and Singapore during the event

Figure 3 displays the response of the stock index movement in Indonesia, Malaysia, and Singapore at the time of the first case of COVID-19. Overall, all stock indexes received negative-actual returns due to the emergence of positive cases of COVID-19 in each country. It can be shown through the Malaysian sharia index, namely the MIDSCAP index, which experienced the sharpest decline of 2.45%. It was because most people in Malaysia were worried about the rising cases of COVID-19, considering the characteristics virus easily spread from one country to another. Thus, the emergence of uncertainty in the stock market resulted in many stockholders selling their stocks. Meanwhile, the LEADERS index occupied the top position and only decreased by 0.39%. It was because the Singapore government handled the pandemic well during the COVID-19 pandemic.

4.1.3 The VECM results

The output table of the pre-tests of stationarity, lag optimum, stability, and cointegration can be seen in the appendix, showing that VECM was the proper method since the data were not stationary in level, but they were stationary in the first difference, and cointegrations between variables existed.

4.1.3.1 Stationarity Test

Based on Appendix I, it was found that at the level, all variables had an Augmented Dicky-Fuller (ADF) t-statistic value and the Phillips Perron (PP) t-statistic value smaller than the critical value, Mackinnon, except for CAR_LEADERS and CAR_TRANS, which were stationary at the level of the ADF test and PP test on intercept, trend and intercept, and none. Meanwhile, the COVID_IND variable was only stationary at the level of the ADF test. Moreover,

in Appendix II, it can be explained that all variables were stationary at level 1st difference. The Augmented Dicky-Fuller (ADF) t-statistic value and the Phillips Perron (PP) t-statistic value were greater than the Mackinnon critical value. Thus, it can be concluded that the appropriate research model was the VECM method because all variables were stationary at level 1st difference.

4.1.3.2 Lag Optimum

In carrying out the lag length, one of the criteria, Akaike Information (AIC), can be determined by choosing the smallest AIC value (Widarjono, 2018). Based on the optimum lag test result in appendix III, it was revealed that the lag of each of these variables was around lags to 2,6 and 7.

4.1.3.3 VAR Stability Test

In testing the VECM method, the VAR stability test needs to be done first. It is carried out to ensure the impulse response function analysis becomes valid and stable (Rusydiana, 2009). When all the roots in the VAR system have a modulus smaller than one, the VAR system can be said to be stable (Gujarati, 2003). Based on Appendix IV, the results indicated that the model used in each variable showed a stable condition because all these variables had a modulus value below one. Thus, the impulse response function analysis could be said to be valid.

4.1.3.4 Cointegration Test

Appendix V shows the cointegration test results using the Johansen cointegration test (Widarjono, 2018). The results uncovered a long-term relationship between the dependent and independent variables. It can be shown through the trace statistic value compared to the critical value. These results found that the variables studied had a value trace statistic greater than the critical value. Hence, it can be interpreted that the variables studied had a long-term relationship between one variable and another. It can be concluded that the VECM model could be used in this study because the variables studied had cointegration.

4.1.3.5 The VECM Estimation Results

Table 7. Short-term and long-term VECM estimation in Indonesia

	SHORT-TERM			
Error Correction:	CAR_JII30	CAR_JII70	CAR_ISSI	CAR_SRIKEHATI
CointEq1	-0.132***	-0.074***	-0.010	-0.054***
	[-4.517]	[-4.595]	[-0.416]	[-2.386]
D(COVID(-1))	-0.000***	-0.000***	-0.000*	0.000
	[-2.564]	[-2.694]	[-1.54596]	[0.317]
D(COVID(-2))	-0.000*	-0.000**	0.000	-0.000**
	[-1.471]	[-1.667]	[0.188]	[-2.313]
D(COVID(-3))	-0.000***	-0.000***	-	-0.000**
	[-2.767]	[-2.834]		[-2.090]
D(COVID(-4))	-0.000***	-0.000***	-	-0.000**
	[-2.690]	[-2.462]		[-2.058]
D(COVID(-5))	-0.000***	-0.000***	-	-0.000
	[-3.014]	[-2.553]		[-0.991]
D(COVID(-6))	-0.000***	-0.000***	-	0.000
	[-3.769]	[-3.488]		[0.676]
D(COVID(-7))	-	-	-	0.000
				[0.431]
D(INT(-1))	0.857	-0.110	-0.038	-0.425
	[0.507]	[-0.079]	[-0.036]	[-0.302]
D(INT(-2))	-1.332	-1.359	0.047	1.052
	[-0.791]	[-0.987]	[0.044]	[0.742]
D(INT(-3))	1.484	0.127	-	2.014*
	[0.867]	[0.092]		[1.324]
D(INT(-4))	0.165	-0.084	-	1.998*
	[0.095]	[-0.060]		[1.298]
D(INT(-5))	0.825	0.991	-	-1.374
	[0.478]	[0.724]		[-0.859]
D(INT(-6))	3.678**	1.670	-	1.868
	[2.103]	[1.186]		[1.193]
D(INT(-7))	-	-	-	0.172
				[0.102]
D(LOGDJIA(-1))	0.147***	0.066***	0.019	0.069*
	[3.747]	[2.875]	[1.007]	[1.495]
D(LOGDJIA(-2))	0.156 ***	0.079***	0.032**	0.040
	[3.492]	[2.761]	[2.000]	[0.799]
D(LOGDJIA(-3))	0.081**	0.043*	-	-0.005
	[1.818]	[1.435]		[-0.129]
D(LOGDJIA(-4))	0.048	0.010	-	0.029
	[1.140]	[0.362]		[0.794]
D(LOGDJIA(-5))	0.090**	0.059**	-	0.028
	[2.299]	[2.101]		[0.891]
D(LOGDJIA(-6))	0.046*	0.024	-	0.018
	[1.581]	[1.094]		[0.626]
D(LOGDJIA(-7))	-	-	-	-0.023
				[-0.904]
D(LOGKURS(-1))	0.434***	0.272***	0.186***	-0.113
	[3.387]	[2.639]	[2.983]	[-0.868]

Descriptions: *= significant at 10%, **= significant at 5%, ***= significant at 1%

Table 7 (cont). Short-term and long-term VECM estimation in Indonesia

SHORT-TERM				
Error Correction:	CAR_JII30	CAR_JII70	CAR_ISSI	CAR_SRIKEHATI
D(LOGKURS(-2))	-0.154	-0.093	-0.140**	-0.055
	[-1.116]	[-0.848]	[-2.247]	[-0.457]
D(LOGKURS(--3))	-0.305***	-0.260***	-	-0.107
	[-2.366]	[-2.541]		[-0.986]
D(LOGKURS(-4))	0.020	-0.005	-	0.145*
	[0.145]	[-0.045]		[1.451]
D(LOGKURS(-5))	0.090	0.189**	-	-0.068
	[0.710]	[1.836]		[-0.645]
D(LOGKURS(-6))	-0.208**	-0.148*	-	0.005
	[-1.793]	[-1.565]		[0.054]
D(LOGKURS(-7))	-	-	-	-0.042
				[-0.407]
LONG-TERM				
Cointegrating Eq:	CointEq1			
	CAR_JII30	CAR_JII70	CAR_ISSI	CAR_SRIKEHATI
COVID(-1)	-0.000***	-0.000***	-0.000**	0.000***
	[-4.872]	[-4.044]	[-1.997]	[2.915]
INT(-1)	5.292*	8.316*	1.277	23.498***
	[1.423]	[1.506]	[0.681]	[4.587]
LOG(DJIA)(-1)	1.065***	0.814***	0.526***	1.508***
	[4.910]	[2.627]	[6.085]	[4.013]
LOG(KURS)(-1)	1.465***	1.002**	0.698***	2.876***
	[3.936]	[1.850]	[4.521]	[4.185]
C	-25.134	-18.275	-12.125	-44.055
R-Squared	0.641	0.620	0.272	0.634
F-Statistic	3.525***	3.216**	2.898**	2.655**

Descriptions: *= significant at 10%, **= significant at 5%, ***= significant at 1%

Table 7 shows that the COVID variable negatively and significantly affected all Islamic stock indexes in Indonesia in the short and long term. Meanwhile, on the ESG index, the COVID variable only had a negative and significant effect in the short term. It denotes that when there was an increase in the number of positive cases of COVID-19, it could reduce the sharia stock index performance in the short and long term and the ESG index only in the short term. However, the results differed from the ESG index in the long term; when there was an increase in the number of positive cases of COVID-19, it could improve the ESG stock index performance in the long term.

Table 8. Short-term and long-term VECM estimation in Malaysia

	SHORT-TERM			
Error Correction:	CAR_EMAS	CAR_HIJRAH	CAR_MIDSCAP	CAR_F4GBM
CointEq1	0.062**	0.134***	0.001	-0.005
	[1.757]	[3.167]	[0.291]	[-1.265]
D(COVID(-1))	-0.000	-0.000	0.000	0.000
	[-0.001]	[-0.275]	[0.092]	[0.789]
D(COVID(-2))	0.000	0.000**	-0.000*	-0.000
	[1.006]	[1.699]	[-1.663]	[-0.968]
D(COVID(-3))	0.000	0.000	-0.000	-0.000
	[0.077]	[0.862]	[-0.475]	[-0.587]
D(COVID(-4))	-0.000	-0.000	-0.000	0.000**
	[-1.028]	[-0.693]	[-0.271]	[1.996]
D(COVID(-5))	-0.000**	-0.000**	0.000	0.000**
	[-1.797]	[-2.314]	[0.122]	[1.663]
D(COVID(-6))	-0.000***	-0.000***	0.000	0.000***
	[-3.127]	[-3.076]	[0.989]	[2.491]
D(COVID(-7))	-	-0.000**	-	-
		[-2.306]		
D(INT(-1))	1.868	3.301**	1.448	-1.026
	[1.285]	[1.751]	[0.238]	[-1.257]
D(INT(-2))	-0.088	1.700	-1.659	-0.873
	[-0.062]	[0.996]	[-0.275]	[-1.072]
D(INT(-3))	1.483	1.672	0.809	-0.171
	[1.029]	[0.927]	[0.132]	[-0.206]
D(INT(-4))	1.735	1.908	22.042***	2.374***
	[1.265]	[1.130]	[3.772]	[3.033]
D(INT(-5))	4.023***	6.854	-9.820*	-1.433**
	[2.775]	[3.898]***	[-1.540]	[-1.690]
D(INT(-6))	-0.441	0.063	12.287**	0.779
	[-0.304]	[0.035]	[1.908]	[0.916]
D(INT(-7))	-	3.597**	-	-
		[2.023]		
D(LOGDJIA(-1))	-0.057 ***	-0.101***	0.319**	0.091***
	[-2.395]	[-3.459]	[2.251]	[5.437]
D(LOGDJIA(-2))	-0.023	-0.104***	0.188	0.059***
	[-1.024]	[-3.126]	[1.264]	[3.105]
D(LOGDJIA(-3))	-0.001	-0.035	-0.034	0.002
	[-0.055]	[-1.216]	[-0.261]	[0.139]
D(LOGDJIA(-4))	0.017	0.037	-0.130	-0.012
	[0.721]	[1.204]	[-0.969]	[-0.683]
D(LOGDJIA(-5))	-0.007	-0.043*	0.366***	0.063***
	[-0.288]	[-1.404]	[2.696]	[3.525]
D(LOGDJIA(-6))	0.039**	0.018	-0.069	0.019
	[1.740]	[0.571]	[-0.561]	[1.136]

Table 8 (cont). Short-term and long-term VECM estimation in Malaysia

SHORT-TERM				
Error Correction:	CAR_EMAS	CAR_HIJRAH	CAR_MIDSCAP	CAR_F4GBM
D(LOGDJIA(-7))	-	-0.017	-	-
		[-0.619]		
D(LOGKURS(-1))	-0.178	-0.200	2.362***	0.321***
	[-0.995]	[-0.911]	[2.584]	[2.805]
D(LOGKURS(-2))	0.157	0.184	-1.270*	0.001
	[0.881]	[0.827]	[-1.376]	[0.009]
D(LOGKURS(--3))	-0.063	0.206	0.065	-0.056
	[-0.357]	[0.952]	[0.077]	[-0.510]
D(LOGKURS(-4))	-0.102	-0.060	0.309	0.063
	[-0.580]	[-0.282]	[0.360]	[0.555]
D(LOGKURS(-5))	0.030	-0.351**	-0.048	0.137
	[0.183]	[-1.674]	[-0.057]	[1.238]
D(LOGKURS(-6))	0.068	0.148	-0.227	0.021
	[0.484]	[0.749]	[-0.319]	[0.236]
D(LOGKURS(-7))	-	0.021	-	-
		[0.120]		
LONG-TERM				
Cointegrating Eq:	CointEq1			
	CAR_EMAS	CAR_HIJRAH	CAR_MIDSCAP	CAR_F4GBM
COVID(-1)	0.000***	0.000	0.040***	0.003***
	[2.553]	[0.573]	[4.987]	[4.174]
INT(-1)	-20.385***	-20.692***	-78.065	-31.883**
	[-6.679]	[-8.529]	[-0.573]	[-1.923]
LOG(DJIA) (-1)	-0.105	-0.173**	18.528***	1.150**
	[-1.008]	[-2.084]	[3.284]	[1.884]
LOG(KURS) (-1)	-1.637***	-2.290***	5.218	-3.394*
	[-4.182]	[-7.460]	[0.286]	[-1.566]
C	4.012	5.642	-195.172	-6.070
R-Squared	0.430	0.607	0.612	0.659
F-statistic	1.558	2.489**	3.269**	4.000***

Descriptions: *= significant at 10%, **= significant at 5%, ***= significant at 1%

In general, Table 8 shows that the COVID variable had a negative and significant effect on the sharia stock index in Malaysia only in the short term. It signifies that an increase in the number of positive cases of COVID-19 could reduce the sharia stock index performance in the short term. Meanwhile, the COVID variable had a positive and significant effect on the sharia stock index in the long term and the ESG index in the short and long term. But the HIJRAH index did not have a significant impact in the long term. It denotes that when there was an increase in the number of positive cases of COVID-19, it could improve the sharia stock index performance in the long term except the HIJRAH index, and the ESG index both in the short term and in the long term.

Table 9. Short-term and long-term VECM estimation in Singapore

	SHORT-TERM		
Error Correction:	CAR_LEADERS	CAR_TRANS	CAR_SGXSHAR
CointEq1	-0.765***	-0.622**	-0.001
	[-2.406]	[-2.063]	[-0.079]
D(COVID(-1))	-0.000**	-0.000*	-0.000
	[-1.754]	[-1.412]	[-0.506]
D(COVID(-2))	-0.000**	-0.000*	-0.000
	[-1.912]	[-1.600]	[-0.385]
D(COVID(-3))	-0.000***	-0.000**	0.000
	[-2.541]	[-2.218]	[0.536]
D(COVID(-4))	-0.000**	-0.000**	0.000
	[-2.080]	[-1.792]	[0.524]
D(COVID(-5))	-0.000**	-0.000*	0.000
	[-1.855]	[-1.614]	[0.016]
D(COVID(-6))	-0.000**	-0.000**	-0.000
	[-2.046]	[-1.749]	[-0.165]
D(COVID(-7))	-0.000**	-0.000**	-0.000
	[-2.056]	[-1.746]	[-0.146]
D(INT(-1))	5.850*	6.733**	-0.587
	[1.545]	[1.782]	[-0.231]
D(INT(-2))	-0.511	-0.287	-5.962***
	[-0.218]	[-0.125]	[-2.525]
D(INT(-3))	-0.419	-0.326	-4.406**
	[-0.191]	[-0.152]	[-1.903]
D(INT(-4))	0.357	1.396	0.326
	[0.139]	[0.553]	[0.129]
D(INT(-5))	-1.855	-0.877	0.965
	[-0.726]	[-0.349]	[0.404]
D(INT(-6))	-3.932*	-3.418*	4.890**
	[-1.556]	[-1.384]	[1.862]
D(INT(-7))	-6.668**	-5.753**	3.218
	[-2.076]	[-1.796]	[1.011]
D(LOGDJIA(-1))	-0.048	-0.052	0.135**
	[-0.831]	[-0.950]	[2.312]
D(LOGDJIA(-2))	0.109**	0.105**	0.133**
	[1.804]	[1.820]	[1.943]
D(LOGDJIA(-3))	0.078	0.065	0.081
	[1.217]	[1.057]	[1.191]
D(LOGDJIA(-4))	0.019	0.004	0.0744
	[0.316]	[0.072]	[1.183]
D(LOGDJIA(-5))	-0.129**	-0.129**	0.056
	[-2.138]	[-2.218]	[0.891]
D(LOGDJIA(-6))	0.106**	0.105**	0.070
	[1.739]	[1.830]	[1.036]

Table 9 (cont). Short-term and long-term VECM estimation in Singapore

SHORT-TERM			
Error Correction:	CAR_LEADERS	CAR_TRANS	CAR_SGXSHAR
D(LOGDJIA(-7))	-0.020	-0.006	0.095*
	[-0.292]	[-0.094]	[1.470]
D(LOGKURS(-1))	-0.225	-0.478	-0.693
	[-0.394]	[-0.856]	[-1.209]
D(LOGKURS(-2))	-0.851*	-0.896*	0.268
	[-1.551]	[-1.648]	[0.493]
D(LOGKURS(--3))	1.552***	1.490***	-0.640
	[2.766]	[2.727]	[-1.172]
D(LOGKURS(-4))	-0.547	-0.584	0.397
	[-0.956]	[-1.041]	[0.803]
D(LOGKURS(-5))	-1.294**	-1.140**	0.145
	[-1.973]	[-1.760]	[0.262]
D(LOGKURS(-6))	-0.175	-0.104	0.521
	[-0.299]	[-0.180]	[1.028]
D(LOGKURS(-7))	-0.017	0.048	-0.867*
	[-0.028]	[0.080]	[-1.637]
LONG-TERM			
Cointegrating Eq:	CointEq1		
	CAR_LEADERS	CAR_TRANS	CAR_SGXSHAR
COVID(-1)	-0.000***	-0.000***	-0.002***
	[-8.550]	[-8.895]	[-5.494]
INT(-1)	-7.777***	-8.054***	-85.917***
	[-12.241]	[-12.302]	[-7.053]
LOG(DJIA) (-1)	0.061***	0.040***	0.106
	[9.385]	[6.110]	[0.709]
LOG(KURS) (-1)	0.128***	0.124***	1.624**
	[3.198]	[2.967]	[2.123]
C	-0.499	-0.280	0.251
R-Squared	0.793	0.793	0.534
F-Statistic	6.195***	6.197***	1.847**

Descriptions: *= significant at 10%, **= significant at 5%, ***= significant at 1%

Table 9 displays that the COVID variable had a negative and significant effect on the sharia stock index in Singapore in the long term and the ESG index both in the short and long term. In other words, an increase in the number of positive cases of COVID-19 could reduce the sharia stock index performance in the long term and the ESG index both in the short and long term. However, there are interesting results on the sharia stock index in the short term, revealing that the COVID variable had no significant effect on the sharia stock index. It indicates that when there was an increase in the number of positive cases of COVID-19, it had no significant effect on the sharia stock index performance in the short term.

4.1.4 Impulse Response Function

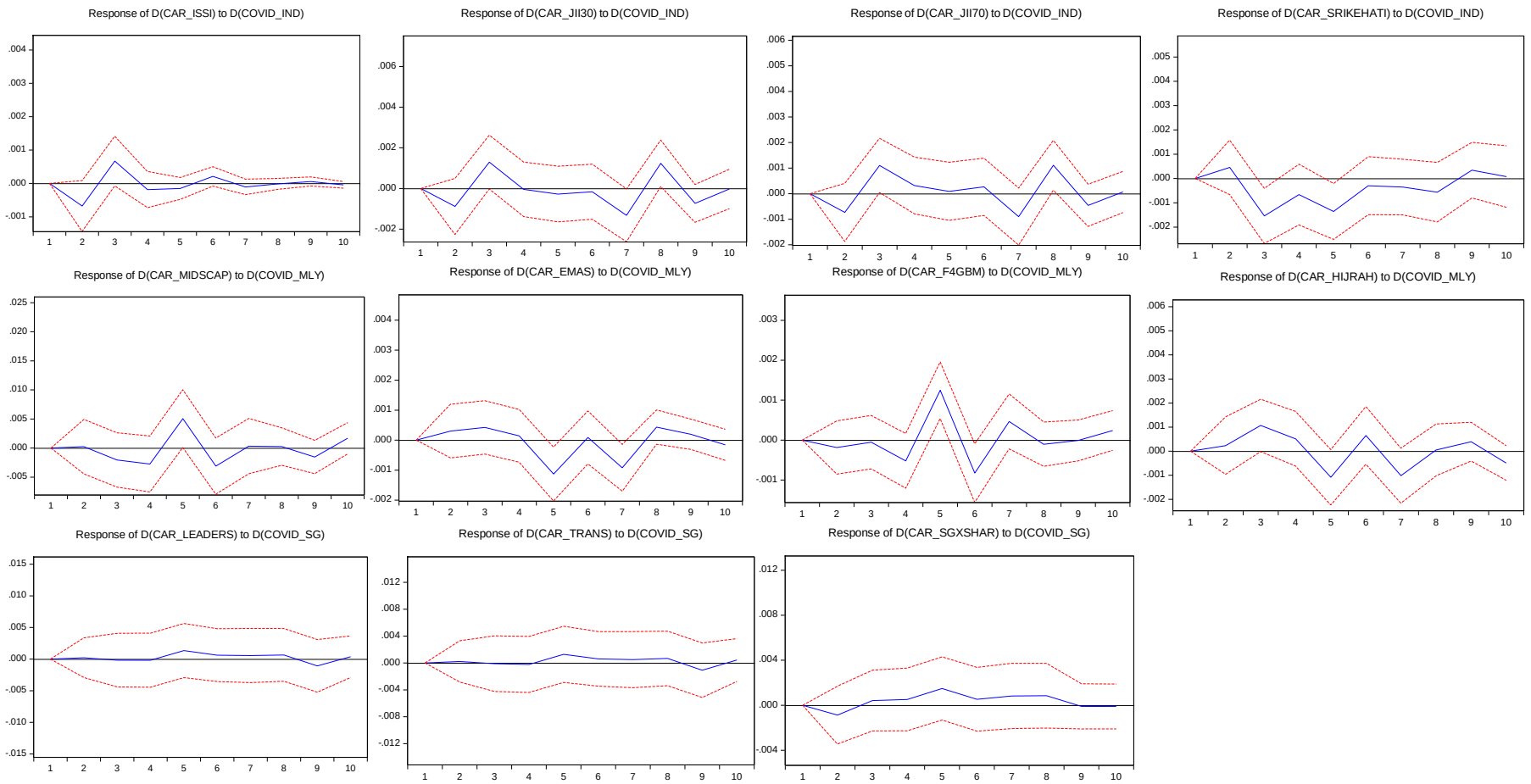

Figure 4. The IRF results in Indonesia (IND), Malaysia (MLY), and Singapore (SG)

Based on Figure 4 about the IRF calculation results, the country that experienced the most shock when a pandemic occurred was Malaysia. It can be seen that in the middle of the period, the stock index in Malaysia experienced very sharp fluctuations. Meanwhile, Singapore was the country that experienced the lowest shock. It can be seen through the stable movement of the graph from the beginning of the period to the end of the period. Although at the end of the period, it showed a decline. However, overall fluctuations in Singapore's stock index were relatively stable compared to other countries.

4.2. Analysis

In this study, the event study method and VECM showed different results in each country. According to the event study calculation in Indonesia, the first case of COVID-19 had a positive and significant impact on all the stock indexes from the day of the incident until the following days. It was because, in the authors' view, many Indonesian people still did not know the COVID-19 virus characteristics at the time of the incident. Moreover, there was still no government policy such as a lockdown policy at that time. Thus, the emergence of the first case of COVID-19 still had a positive and significant impact on the stock index. This result follows research by Khatatbeh et al. (2020) that the stock market in China had a positive and significant CAR value after the first confirmed case of COVID-19 on December 31, 2019.

In addition, the VECM results revealed that the COVID variable had a negative and significant effect on all indexes both in the long and short term, except for the ESG index, which had a positive and significant effect in the long term. It was because the characteristics of the companies listed in the ESG stock index prioritize business practices with environmental, social, and governance principles with the potential to have good returns. Thus, most companies listed on the ESG index, namely SRI-KEHATI, were likely to have good potential in the long term. This result does not align with the research conducted by He et al. (2020), stating that the COVID-19 pandemic would not have a significant effect in the long term. However, it had a short-term negative impact on the stock market.

Then, in Malaysia, according to the event study calculation, the first case of COVID-19 had a negative and significant impact on all stock indices from before the day of the incident until the following days, except the ESG index, which was only negative and significant on certain days. This result is also supported by the VECM calculation that the COVID variable negatively and significantly affected the sharia stock index in the short term. The negative and significant effect was because the number of positive cases increased every day since the first. According to Lee et al. (2020), the number of positive cases of COVID-19 increased until it reached 25 cases at the end of February.

Then, it increased rapidly on March 31 to 2,626 cases. As a result, the Malaysian government announced a Movement Control Order (MCO) effective from March 18 to March 31, 2020. Thus, it resulted in many stockholders selling their stock due to concerns caused by COVID-19 and MCO. These results are consistent with the research by He et al. (2020), showing that the COVID-19 pandemic negatively impacted stock prices on the Shanghai Stock Exchange.

However, the results were different for the VECM calculation in the long-term sharia stock index and the ESG index, which had a positive and significant impact due to the COVID-19 pandemic. It happened because, over time, the company might be able to adapt to new circumstances. Not only that, with increasing digitization, it is also possible for companies to create more innovations in the future. Thus, the COVID-19 pandemic in Malaysia could have a positive and significant impact. These results are in accordance with the research conducted by Hidayat, Maulana, and Arief (2021), which found that in the long term, COVID-19 had a positive and significant impact on the JCI performance.

Moreover, according to the event study calculation in Singapore, the Islamic stock index experienced a negative and significant effect after the COVID-19 pandemic. These results support the research conducted by Liu et al. (2020) that cases of confirmed positive COVID-19 had a significant and detrimental effect on the performance of the stock index, especially the index in Asia, which experienced a greater decline in stock indexes. However, when the first case of COVID-19 appeared, it had a positive and significant impact. Meanwhile, the ESG stock indexes did not experience a significant impact. This result is also supported by the VECM calculation, showing that the COVID variable had no significant effect on the Islamic stock index in the short term. It was because when the COVID-19 pandemic occurred, the Singapore government handled it swiftly. According to Woo (2020), key fiscal, analytical, operational, and political capacities created after the SARS crisis in Singapore in 2003 made the country stronger in responding to the initial onset of COVID-19. Thus, it resulted in a positive impact on stock markets.

In addition, based on the VECM calculation in the long term, the COVID variable had a negative and significant effect on all stock indexes in Singapore, both sharia and ESG. According to the ECDC (2020), the number of positive cases of COVID-19 in Singapore increased sharply by 1,426 people in April 2020. It led to panic selling to investors and a shift of funds by investors to safer instruments. It caused the shares in the index to experience a significant decline. This finding has the same results as those of Novalina and Rusiadi (2020), which showed that during the COVID-19 pandemic, financial and trade indexes had a significant effect in the long run.

V. Conclusion and Recommendation

5.1. Conclusion

Based on the research, it can be concluded that the results of the regression estimation event study showed that the Islamic stock index and the ESG stock index in Indonesia experienced a positive and significant impact after the positive case of COVID-19. In contrast to Singapore, the Islamic stock index experienced a negative and significant impact in responding to the positive case of COVID-19, while the ESG stock index did not significantly influence responding to the COVID-19 pandemic. In Malaysia, the sharia stock index experienced a negative and significant influence even before and after the positive case of COVID-19, whereas the ESG stock index only had a significant negative effect on certain days.

Then, the VECM estimation results revealed significant results in almost all the variables studied. Since the first case of COVID-19, this study found that almost all stock indexes experienced a significant long-term and short-term effect. However, this result did not match the sharia stock index in Singapore, which showed that the index did not have a significant effect in the short term, and the sharia stock index in Malaysia namely the HIJRAH index did not have a significant effect in the long term.

Thus, based on the calculation results, it can be concluded that almost all the results obtained on the ESG stock index showed a positive and significant impact when responding to the pandemic. Meanwhile, Islamic stock indexes experienced more negative and significant effects on the pandemic. It means that, overall, the ESG stock index performance is considered to be better than the sharia stock index. In addition, when the ESG stock index experienced a negative and significant impact, the perceived impact was not too large, as indicated by the low coefficient value experienced by the ESG stock index in Singapore in the long term. The findings of this study can be explained in Table 10.

In general, from these findings, almost all the results rejected hypothesis 3, stating that the sharia stock index performance was better than Southeast Asia's environmental, social, and governance stock index performance during the COVID-19 pandemic. In this study, almost all the results obtained by the ESG stock index showed a positive and significant impact when responding to the pandemic. Moreover, when the ESG stock index experienced a negative and significant impact, the perceived impact was not too large, as indicated by the low coefficient value experienced by the ESG stock index in Singapore in the long term. In addition, this finding also aligns with the theoretical framework proposed by Fama (1970). It agrees with the research conducted because prices on the stock index in Indonesia, Malaysia, and Singapore

responded to information on the emergence of the first case of COVID-19, creating a new equilibrium price.

Table 10. Hypothesis conclusion

Hypothesis 1	Hypothesis 2	Hypothesis 3
	Event Study	
Accepted	Accepted in the calculation of Indonesia and Malaysia Rejected in the calculation of Singapore	Accepted only in the calculation of Indonesia Rejected in the calculation of Malaysia and Singapore
	VECM	
Accepted in the calculation of Indonesia, Malaysia, excepted the HIJRAH index in the long term, and Singapore in the long term Rejected in the calculation of Singapore in the short term and Malaysia, namely the HIJRAH index in the long term	Accepted	Accepted only in the calculation of Singapore in the short term Rejected in the calculation of Singapore in the long term, Indonesia, and Malaysia

5.2. Recommendation

For investors, this finding illustrates that investing in stocks during a pandemic significantly impacts the long and short term. This research is also expected to help investors identify several factors that need to be studied before investing in stock instruments during the COVID-19 pandemic by monitoring the development of the number of positive cases of COVID-19 in each country. However, the study found that the ESG stock index was considered to have performed well despite the COVID-19 pandemic. It indicates that companies listed on the ESG index may be able to adapt well in responding to the COVID-19 pandemic. Moreover, the business implementation carried out by companies listed on the ESG index also prioritizes environmental, social, and good governance awareness to have better prospects.

Furthermore, the government needs to properly pay more attention to the long-term and short-term effects of the COVID-19 pandemic on the performance of stock indexes. The government also needs to focus more on handling COVID-19 cases by increasing the production of COVID-19 vaccinations to inhibit the growth of positive cases of COVID-19 and prevent the emergence of new variants of COVID-19.

However, this research has several limitations; firstly, in determining the event date in the event study calculation, this study used the day when the announcement of the first case of COVID-19 occurred in each country. Thus,

it still did not describe the state of the pandemic's impact on the stock index performance. Second, this study employed all indexes in the sharia stock index and the ESG stock index, so the two indexes with the same shares might have overlapping results.

Based on the limitations in this study, the authors recommend further research to determine the day of different events in analyzing the event study, such as at the time of the announcement of the lockdown policy. Then, further research can be conducted to investigate the effect of COVID-19 on other indexes, use other proxies for the COVID-19 pandemic variable, and add other complementary variables, adding new points to the research carried out.

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Appendix

Appendix I. Unit *root test at level*

Variable	*Unit Root Test (at Level)*						Conclusion
	Intercept		Trend and Intercept		None		
	ADF	PP	ADF	PP	ADF	PP	
CAR_ SRIKEHATI	-1.261	-1.313	-0.718	-0.845	-0.719	-0.776	Not Stationary
CAR_ISSI	2.259	3.671	-0.170	0.564	3.574	5.526	Not Stationary
CAR_JII30	2.119	2.711	-0.486	-0.195	3.488	4.260	Not Stationary
CAR_JII70	2.806	4.107	0.007	0.600	4.273	5.983	Not Stationary
CAR_F4GBM	-0.931	-1.041	-1.571	-1.904	-0.018	-0.189	Not Stationary
CAR_EMAS	-0.984	-0.873	-2.605	-2.728	1.221	1.502	Not Stationary
CAR_HIJRAH	-2.152	-2.334	-2.276	-2.544	-0.534	-0.637	Not Stationary
CAR_MIDSCAP	-1.273	-0.889	-2.098	-1.625	-0.324	0.214	Not Stationary
CAR_LEADERS	-8.715***	-8.920***	-9.040***	-9.176***	-3.108***	-7.896***	Stationary
CAR_TRANS	-7.968***	-8.437***	-9.042***	-9.180***	-2.674***	-7.153***	Stationary
CAR_SGXSHAR	-0.715	-0.924	-1.949	-2.016	0.225	-0.118	Not Stationary
COVID_IND	-4.113***	-0.854	-4.586***	-2.851	-3.980***	-0.223	Stationary
COVID_MLY	-1.231	-2.465	-1.578	-3.183	-0.793	-1.335	Not Stationary
COVID_SG	0.774	-1.138	-0.207	-2.073	1.088	-0.787	Not Stationary
LOG(KURS_IND)	-1.280	-0.928	-1.516	-1.446	0.166	0.435	Not Stationary
LOG(KURS_MLY)	-0.984	-0.885	-2.157	-2.104	0.395	0.530	Not Stationary
LOG(KURS_SG)	-1.337	-1.036	-2.526	-2.197	0.485	0.620	Not Stationary
INT_IND	-0.821	-0.816	-2.042	-2.063	-1.459	-1.489	Not Stationary
INT_MLY	-0.945	-0.935	-2.229	-2.296	-1.492	-1.536	Not Stationary
INT_SG	-0.325	-0.318	-1.753	-1.753	-1.174	-1.178	Not Stationary
LOG(DJIA_IND)	-0.937	-1.181	-1.455	-1.936	-0.527	-0.523	Not Stationary
LOG(DJIA_MLY)	-1.400	-1.299	-2.018	-1.818	-0.560	-0.438	Not Stationary
LOG(DJIA_SG)	-1.400	-1.299	-2.018	-1.818	-0.560	-0.438	Not Stationary

Descriptions: *= significant at 10%, **= significant at 5%, ***= significant at 1%

Appendix II: *Unit root test at 1st difference*

Variable	Unit Root Test (at 1st difference)						Conclusion
	Intercept		Trend and Intercept		None		
	ADF	PP	ADF	PP	ADF	PP	
CAR_ SRIKEHATI	-8.305***	-8.354***	-8.339***	-8.379***	-8.335***	-8.416***	Stationary
CAR_ISSI	-7.924***	-7.782***	-8.488***	-8.623***	-7.483***	-7.481***	Stationary
CAR_JII30	-7.827***	-7.749***	-8.326***	-8.116***	-7.374***	-7.374***	Stationary
CAR_JII70	-8.500***	-8.486***	-9.391***	-9.464***	-7.819***	-7.911***	Stationary
CAR_F4GBM	-11.112***	-11.143***	-11.060***	-11.100***	-11.044***	-11.112***	Stationary
CAR_EMAS	-9.255***	-9.735***	-9.214***	-9.770***	-8.943***	-8.874***	Stationary
CAR_HIJRAH	-5.788***	-9.949***	-5.773***	-9.904***	-5.755***	-9.954***	Stationary
CAR_MIDSCAP	-3.290**	-10.050***	-3.279*	-10.016***	-3.199***	-10.035***	Stationary
CAR_LEADERS	-12.275***	-27.088***	-12.227***	-27.080***	-12.338***	-27.254***	Stationary
CAR_TRANS	-12.332***	-24.503***	-12.279***	-26.947***	-12.396***	-24.647***	Stationary
CAR_SGXSHAR	-8.118***	-8.278***	-8.077***	-8.240***	-8.074***	-8.238***	Stationary
COVID_IND	-2.621*	-20.149***	-3.257*	-22.684***	-2.361**	-20.939***	Stationary
COVID_MLY	-11.007***	-16.732***	-10.948***	-16.641***	-11.045***	-16.767***	Stationary
COVID_SG	1.575	-13.458***	0.885	-13.571***	1.825	-13.431***	Stationary
LOG(KURS_IND)	-3.930***	-8.429***	-3.857**	-8.377***	-3.962***	-8.451***	Stationary
LOG(KURS_MLY)	-6.945***	-6.891***	-6.901***	-6.925***	-6.967***	-6.913***	Stationary
LOG(KURS_SG)	-4.557***	-9.066***	-4.532***	-9.028***	-4.535***	-9.052***	Stationary
INT_IND	-10.004***	-10.005***	-9.952***	-9.953***	-9.848***	-9.848***	Stationary
INT_MLY	-10.152***	-10.156***	-10.106***	-10.108***	-10.000***	-10.000***	Stationary
INT_SG	-10.079***	-10.079***	-10.144***	-10.149***	-10.000***	-10.000***	Stationary
LOG(DJIA_IND)	-13.819***	-13.339***	-13.747***	-13.276***	-13.862***	-13.368***	Stationary
LOG(DJIA_MLY)	-14.811***	-13.995***	-14.736***	-13.934***	-14.853***	-14.023***	Stationary
LOG(DJIA_SG)	-14.811***	-13.995***	-14.736***	-13.934***	-14.853***	-14.023***	Stationary

Descriptions: *= significant at 10%, **= significant at 5%, ***= significant at 1%

Appendix III. Lag Optimum

Variable	Lag	Criteria
CAR_SRIKEHATI	7	AIC
CAR_JII30	6	AIC
CAR_JII70	6	AIC
CAR_ISSI	2	AIC
CAR_F4GBM	6	AIC
CAR_EMAS	6	AIC
CAR_HIJRAH	7	AIC
CAR_MIDSCAP	6	AIC
CAR_LEADERS	7	AIC
CAR_TRANS	7	AIC
CAR_SGXSHAR	7	AIC

Appendix IV. The result of VAR Stability Test

Variable	Modulus	Conclusion
CAR_SRIKEHATI	<1	Stable
CAR_JII30	<1	Stable
CAR_JII70	<1	Stable
CAR_ISSI	<1	Stable
CAR_F4GBM	<1	Stable
CAR_EMAS	<1	Stable
CAR_HIJRAH	<1	Stable
CAR_MIDSCAP	<1	Stable
CAR_LEADERS	<1	Stable
CAR_TRANS	<1	Stable
CAR_SGXSHAR	<1	Stable

Appendix V: The result of the Johansen Cointegration test

Variable	Trace Statistic	0.05 Critical Value	Conclusion
CAR_SRIKEHATI	97.201	69.818	Cointegrated
CAR_JII30	100.369	69.818	Cointegrated
CAR_JII70	98.603	69.818	Cointegrated
CAR_ISSI	99.081	69.818	Cointegrated
CAR_F4GBM	89.077	69.818	Cointegrated
CAR_EMAS	84.534	69.818	Cointegrated
CAR_HIJRAH	114.788	69.818	Cointegrated
CAR_MIDSCAP	83.721	69.818	Cointegrated
CAR_LEADERS	213.608	69.818	Cointegrated
CAR_TRANS	217.636	69.818	Cointegrated
CAR_SGXSHAR	155.122	69.818	Cointegrated

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