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Original Article

Stock Market Reaction Towards Corona Virus in Indonesia Stock Exchange

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Abstract *- This research's purpose is to discover how every Indonesia Stock Exchange's market sector (primary, secondary, and tertiary) reacted to the announcement of Corona Virus as a global emergency, the announcement of Indonesia Citizens infected with Corona Virus, and the announcement of Corona Virus as a national disaster. The population of this research are all market sectors registered at Indonesia Stock Exchange, and this population will also be used as a sample in this research. Paired sample t-test will be used as a data analysis technique.*

Based on the result, it is found that there is a positive and significant difference of primary sector's abnormal return around the announcement of Corona Virus as a global emergency on daily data period; meanwhile, on other sectors and events, there is no significant difference of abnormal returns.

Keywords *— Abnormal Return, Event Study, Corona Virus.*

I. INTRODUCTION

World Health Organization (WHO) received a report from China National Authorities about an illness that has similar symptoms as pneumonia with an unknown cause on the 31st of December 2019 (WHO, 2020a). Boseley et al. (2020) mention the symptoms are cough, fever, breathing difficulty, even organ failures. This illness was first discovered in the city of Wuhan, Hubei Province, China, and until the 3rd of January 2020, there were 44 cases reported in China (WHO, 2020a). On the 7th of January 2020, Chinese Authorities confirmed that the illness comes from a virus called 2019-nCov or known as Corona Virus (Karp, 2020). WHO (2020b) then issued a warning that mentions Corona Virus as a global emergency on the 30th of January 2020, and at the end of January 2020, there are already 9826 infected people in various countries. WHO then announce a new name for the virus, which is COVID-19 for "Coronavirus Disease 2019" (WHO, 2020c).

Inman (2020) mentions China, with a Gross Domestic Product worth of $13.6 Trillion which is the second-largest economy in the world, had to close some industries temporary because of Corona Virus, resulting in decreased economic activities, decreased tourism industry income, and fluctuate Asian stock market on early February of 2020. This also happened in Indonesia with a 1.78% decrease in the Jakarta Composite Index (JCI) on the 27th of January 2020 because of investor's fear of virus' spreads (Akhlas, 2020) and decrease of total international tourist arrival by 7.62% on January 2020 (BPS, 2020).

Eventually, on the 2nd of March 2020, Indonesia's President, Joko Widodo, announced the first two Indonesian infected by Corona Virus (CNN Indonesia, 2020a) and on the 13th of March 2020, there is an increased number of infected patients to 34 people that triggered the decision to make Corona Virus spread in Indonesia as a national disaster (RI, 2020). Up until the 16th of March 2020, there were 167,511 people infected by Corona Virus, and among them, around 6,606 people have died (WHO, 2020d).

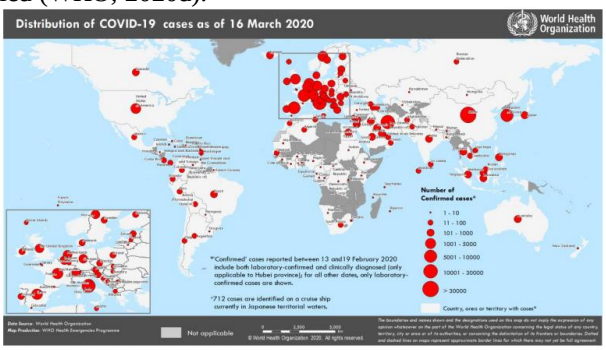

Fig. 1 Infected area of COVID-19 on the 16th of March 2020.
Source: WHO (2020d).

While experts are focusing on the treatment and prevention of the virus, up until now, there is no research discussing the impact of the Corona Virus on stock price movement. The announcement of Corona Virus as a global emergency on the 30th of January 2020, the announcement of the first two Indonesian infected by Corona Virus on the 2nd of March 2020, and the President's decision to announce Corona Virus as a national disaster on the 13th of March 2020 are important events containing information and may cause fluctuation of the stock price in Indonesia. Besides impacting the tourism industry by a decreased number of international tourists arrived in Indonesia,

Corona Virus also weakened the exchange value of rupiah to USA dollar by 15.66% from the beginning of the year up to March 2020, so that economic sector stock also did not has good performance (CNN Indonesia, 2020b) and this also comes with increase price of goods. Meanwhile, there is an increase in medical goods demand because of mass panic that can support the pharmacy industry (CNN Indonesia, 2020c). Besides that, Corona Virus also changes consumers' behaviour that affects many businesses.

Chen et al. (2007) state that hotel industry stocks in Taiwan were sensitives to the SARS pandemic back in 2003. Chun-Da Chen et al. (2009) also supports this finding and states the same result on groceries and retail sector. But there is some difference in the effect on the biotechnology sector; investors believe that this sector has good future performance because of the SARS pandemic along with increasing demand for the mask or other medical goods, which is the output of the biotechnology sector. Aside from that, the Foot-and-Mouth Disease pandemic also caused the weakened of the stock price in Korea in 2010, which was the worst year of the pandemic (Pendell dan Cho, 2013). This research becomes the basis for thinking that pandemics can have a positive or negative effect on stock price depending on an investor's faith in the sector's future performance.

Campbell et al. (1997) said that to rate the impact of an event. An abnormal return can be used with an event study approach. Based on that, this research aims to discover the market reaction on primary sector contains Agriculture and Mining; secondary sector contains Basic, and Chemical Industry, Miscellaneous Industry, and Consumer Goods Industry; tertiary sector contains Property, Real Estate, and Building Construction, Infrastructure, Utility, and Transportation, Finance, Trade, Service, and Investment that registered at Indonesia Stock Exchange around the announcement of Corona Virus as a global emergency, the announcement of infected Indonesians, the announcement of Corona Virus as national disaster using event study approach and abnormal return as the variable. Clustering of sectors at Indonesia Stock Exchange is done to discover the market reaction on every three sectors around the events regarding the Corona Virus.

II. LITERATURE REVIEW AND HYPOTHESIS

A. Literature Review

A stock market will be efficient when the prices fully accommodate the existing information (Fama, 1970). Fama (1970) classify efficient market into three forms of Efficient Market Hypothesis (EMH), those are weak form, when the securities prices only reflect all past information (historical), semi-strong form, when the securities prices at the moment reflect historical information and published information, and strong form, when the securities prices at the moment reflecting historical information, published information, and unpublished information.

According to Campbell et al. (1997), rating the effects of an event with the event study approach can be done by abnormal return calculation. Abnormal return is the difference between the actual return and the expected return (Hartono, 2017).

B. Hypothesis

Chen et al. (2007) found that the decrease of the stock price in the hotel industry is caused by irrational thinking investor panic about the SARS pandemic. Chun-Da Chen et al. (2009) also support this discovery and found the same result in the grocery and retail sector. But the result differs when it is applied to the biotechnology sector. The investor believes that the future performance of this sector is good with the increased demand for masks and medical goods. Foot-and-Mouth Disease also caused a stock price drop in Korea in 2010, which was the worst year of the pandemic (Pendell dan Cho, 2013).

Tao et al. (2019), Valizadeh et al. (2017), and Koerniadi et al. (2016) found that earthquakes had a negative and significant effect on stock market reaction, but they had positive and significant effects on construction stocks due to high demand for construction supplies in order to recover from the disaster. In addition, Guo et al. (2020) found that air pollution events prompted the Chinese government to make environmental regulations that had negative impacts on stock price movements. Also, Feria-Domínguez et al. (2017) and Makino (2016) found that catastrophic events had negative impacts on stock prices. However, if investors did not get panic over the catastrophic event, it would not affect the stock price. Meanwhile, in his research, Yuwono (2013) said that floods had positive impacts on the consumer goods industry sector and retail sub-sector of the stocks.

Papakyriakou et al. (2019), Kolaric and Schiereck (2016), Veron et al. (2017), Ali et al. (2017), Arde and Kesuma (2017), and Ghani (2016) found that terrorist attacks had negative and significant effects on stock prices. However, in their research, Apergis dan Apergis (2016) said that terrorist attacks had positive impacts on the global defence industry due to the increased need for national defence to prevent the occurrence of terrorist attacks. Meanwhile, based on the research of Tecualu and Megge (2010), and Rahmawati and Pandansari (2016), there is no significant difference in abnormal return as the investors may have been prepared for the occurrence of terrorist attacks.

H_{1a}: Abnormal returns on primary sector stocks listed in the Indonesia Stock Exchange differ significantly around the announcement of the Corona Virus as a global emergency.

H_{1b}: Abnormal return on secondary sector stock listed in the Indonesia Stock Exchange differ significantly around the announcement of Corona Virus as a global emergency.

H_{1c}: Abnormal return on tertiary sector stock listed in the Indonesia Stock Exchange differ significantly around the announcement of Corona Virus as a global emergency.

H_{2a}: Abnormal return on primary sector stock listed in the Indonesia Stock Exchange differ significantly around the announcement of Indonesia Citizens infected with Corona Virus.

H_{2b}: Abnormal return on secondary sector stock listed in the Indonesia Stock Exchange differ significantly

around the announcement of Indonesia Citizens infected with Corona Virus.

H_{2c}: Abnormal return on tertiary sector stock listed in the Indonesia Stock Exchange differ significantly around the announcement of Indonesia Citizens infected with Corona Virus.

H_{3a}: Abnormal returns on primary sector stock listed in the Indonesia Stock Exchange differ significantly around the announcement of the Corona Virus as a national disaster.

H_{3b}: Abnormal return on secondary sector stock listed in the Indonesia Stock Exchange differ significantly around the announcement of Corona Virus as a national disaster.

H_{3c}: Abnormal return on tertiary sector stock listed in the Indonesia Stock Exchange differ significantly around the announcement of Corona Virus as a national disaster.

III. RESEARCH METHODOLOGY

This research uses all sectors listed in the Indonesia Stock Exchange. Total of the population is 9 sectors, which the data is collected using the census method. Thus, all populations will be the sample of this research.

The event window is determined as a) 11 days consisted of 5 days before the event, a moment of the event, and 5 days after the event of the announcement of Corona Virus as a global emergency, the announcement of Indonesia Citizens infected with Corona Virus, and the announcement of Corona Virus as a national disaster, b) 11 months consisted of 5 months before the event, a moment of the event, and 5 months after the event of the announcement of Corona Virus as a global emergency.

The variable is the abnormal return of the stock. According to Hartono (2017), the abnormal return can be calculated using the formula of Ari,t = Ri,t – E (Ri,t). Actual return can be calculated by the formula of $R = \frac{IHSS_t - IHSS_{t-1}}{IHSS_{t-1}}$. Expected return can be calculated using the Market-adjusted Model with the formula of $E(Rm,t) = \frac{IHSG_t - IHSG_{t-1}}{IHSG_{t-1}}$. Average Abnormal Return can be calculated by the formula of $AAR_t = \frac{\Sigma ARi,t}{n}$. This research uses a paired sample t-test parametric test to test the significance level of abnormal return during the event window. Normality test is conducted with the Kolmogorov-Smirnov test. If the data is not normally distributed, it is followed by the Wilcoxon Test non-parametric test.

IV. RESULTS AND DISCUSSION

A. Results

a) The Event of the Announcement of the Corona Virus as Global Emergency

Based on the data from daily observation, the market received negative and positive abnormal returns on each of the stock sectors.

Table 1. Average Abnormal Return Descriptive Statistics

Descriptive Statistics						
		N	Minimum	Maximum	Mean	Std.Deviation
Primary Sector	AAR Before	5	-.0086	.0078	-.002340	.0064597
	AAR After	5	-.0082	.0166	.004900	.0102513
	Valid N (listwise)	5				
Primary Sector	AAR Before	5	-.0110	.0049	-.001920	.0058917
	AAR After	5	-.0033	.0009	-.001200	.0015843
	Valid N (listwise)	5				
Primary Sector	AAR Before	5	-.0022	.0032	.000620	.0020192
	AAR After	5	-.0039	.0032	.000760	.0031382
	Valid N (listwise)	5				

The normality test on primary, secondary, and tertiary sectors stock resulted in the data of each sector being normally distributed.

Table 2. Paired Sample T-Test

Paired Differences									
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Primary	Before-After	-.0072400	.0057955	.0025918	-.0144361	-.0000439	-2.793	4	.049
Secondry	Before-After	-.0007200	.0068108	.0030459	-.0091767	.0077367	-.236	4	.825
Tertiary	Before-After	.0013800	.0049201	.0022003	-.0047291	.0074891	.627	4	.565

From Table 2, it could be seen that the primary sector stock showed the value of Sig. (2-tailed) < 0.05, which is 0.049. It meant the abnormal return on primary sector stock listed in Indonesia Stock Exchange had a positive and significant difference around the announcement of Corona Virus as a global emergency. However, the secondary and tertiary sectors showed the value of Sig. (2-tailed) > 0.05, which are 0.825 and 0.565. These numbers showed that the abnormal return on secondary and tertiary sector stocks, listed on Indonesia Stock Exchange, is still the same at the time of the announcement of the Corona Virus as a global emergency.

Based on monthly data observation, the market received negative and positive abnormal returns on each of the stock sectors.

Table 3. Average Abnormal Return Descriptive Statistics

Descriptive Statistics						
		N	Minimum	Maximum	Mean	Std. Deviation
Primary Sector	AAR Before	5	-.0231	.0644	.010100	.0360819
	AAR After	5	-.0128	.0110	-.001320	.0102639
	Valid N (listwise)	5				
Secondary Sector	AAR Before	5	-.0189	.0207	.003900	.0167960
	AAR After	5	-.0459	.0979	.007520	.0607279
	Valid N (listwise)	5				
Tertiary Sector	AAR Before	5	-.0147	.0200	-.001140	.0135182
	AAR After	5	-0.0470	.0171	-.005260	.0246137
	Valid N (listwise)	5				

The normality test on primary and secondary sectors resulted in the data being normally distributed. Meanwhile, the normality test on the tertiary sector resulted in the data was not distributed normally.

Table 4. Paired Sample T-Test

Paired Differences									
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig(2-tailed)
Primary	Before-After	.01114200	.0365997	.0163679	-.0340245	.0568645	.698	4	.524
Secondry	Before-After	-.0036200	.0572053	.0255830	-.0746498	.0674098	-.142	4	.894

Table 5. Wilcoxon Test

Test Statistics	
	After - Before
Z	-.135[b]
Asymp. Sig. (2-tailed)	.893

In Table IV, primary and secondary sectors showed the value of Sig. (2-tailed) > 0.05, which is 0.524 and 0.894, while in Table V, the tertiary sector showed the value of Asymp. Sig. (2-tailed) > 0.05, which is 0.893. These significance values showed that if the data was observed on a monthly basis, there is no difference in abnormal return on primary, secondary, and tertiary sectors listed in the Indonesia Stock Exchange around the announcement of Corona Virus as a global emergency.

b) The Event of the Announcement of Indonesia Citizens Infected with Corona Virus

Based on daily observation data, the market received negative and positive abnormal returns on each of the stock sectors.

Table 6. Average Abnormal Return Descriptive Statistics

Descriptive Statistics						
		N	Minimum	Maximum	Mean	Std. Deviation
Primary Sector	AAR Before	5	-.0169	.0053	-.002000	.0086839
	AAR After	5	-.0093	.0147	.000240	.0091268
	Valid N (listwise)	5				
Secondary Sector	AAR Before	5	-.0201	.0049	.005720	.0097433
	AAR After	5	-.0123	.0044	.001960	.0066399
	Valid N (listwise)	5				
Tertiary Sector	AAR Before	5	-.0001	.0067	-.003940	.0028360
	AAR After	5	-.0037	.0076	-.000080	.0045604
	Valid N (listwise)	5				

The results of the normality test on primary sector stocks showed that the data is not normally distributed, while the data of secondary and tertiary sector stocks were normally distributed.

Table 7. Wilcoxon Test

Test Statistics	
	After - Before
Z	-.674[b]
Asymp. Sig. (2-tailed)	.500

Table 8. Paired Sample T-Test

Paired Differences									
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig.(2-tailed)
Secondry	Before-After	-.0037600	.0088839	.0039730	-.147908	.0072708	-.946	4	.398
Tertiary	Before-After	.0038600	.0036087	.0016139	-.0006208	.0083408	2.392	4	.075

In Table VII, primary sector stock showed the value of Asymp. Sig. (2-tailed) > 0.05, which is 0.500. From Table VIII, it could also be seen that secondary and tertiary sectors showed the value of Sig. (2-tailed) > 0.05, which are 0.398 and 0.075. The significance value of each sector showed that there is no abnormal return difference on primary, secondary, and tertiary sector stocks listed in the Indonesia Stock Exchange around the announcement of Indonesia Citizens Infected with Corona Virus.

c) The Event of the Announcement of Corona Virus as National Disaster

Based on the data from daily observation, it is known that each sector had a positive and negative abnormal return on the market.

Table 9. Average Abnormal Return Descriptive Statistics

Descriptive Statistics						
		N	Minimum	Maximum	Mean	Std. Deviation
Primary Sector	AAR Before	5	-.0126	.0147	-.003900	.0109060
	AAR After	5	.0051	.0207	.007600	.0110447
	Valid N (listwise)	5				
Secondary Sector	AAR Before	5	-.0123	.0069	.002040	.0072200
	AAR After	5	-.0078	.0179	-.000980	.0108583
	Valid N (listwise)	5				
Tertiary Sector	AAR Before	5	-.0107	.0076	-.001360	.0074922
	AAR After	5	-.0055	.0104	.004380	.0060541
	Valid N (listwise)	5				

Based on the results of the normality test on primary, secondary, and tertiary sectors, the data is normally distributed.

Table 10. Paired Sample T-Test

Paired Differences									
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig.(2-tailed)
Primary	Before-After	-.0115000	.0160498	.0071777	-.0314284	.0084284	-1.602	4	.184
Secondry	Before-After	-.0010600	.0128619	.0057520	-.0170301	.0149101	-.184	4	.863
Tertiary	Before-After	-.0056400	.0103125	.0046119	-.0184447	.0071647	-.1.223	4	.288

From Table X, primary, secondary, and tertiary sector stocks showed the value of Sig. (2-tailed) > 0.05, which are 0.184, 0.863, and 0.288. These values mean that there is a difference in abnormal return on primary, secondary, and tertiary sectors listed in the Indonesia Stock Exchange around the event of the announcement of Corona Virus as a national disaster.

B. Discussions

a) The Event of the Announcement of the Corona Virus as Global Emergency

According to the daily based data observation, the event of the announcement of Coronavirus as a global emergency can affect investors' behaviour in investing in primary sector stock. The results show that there is a positive reaction which can be seen through the increased average abnormal return on the primary sector, from -0.0023 to 0.0049.

Positive reactions can be caused by various kinds of information considered as good news on primary sector stock by investors. The emergence of the panic buying phenomenon has resulted in increased demand for public consumption, especially for food crops, livestock and fisheries, which are the community's basic needs and the output of the agricultural sector. In addition, gold, which is the output of the mining sector, is one of the safest options to make investments in times of economic uncertainty. Thus, the outbreak of Coronavirus had caused an increase in demand for gold. The increasing public demand for output from the agricultural and mining sectors encourages investors to believe that companies listed in primary sector stock will have good future performance.

The availability of accurate and reliable sources concerning information related to Coronavirus may also increase investors' confidence in making investments in the Indonesia Stock Exchange, which likely increased the occurrence of transactions on primary sector stock. This assumption supports the theory of Event Study, which states that information related to a particular event, considered as good news, will receive a positive reaction from the market. The results of this research also support the research by Chun-Da Chen et al. (2009), who found a positive reaction in biotechnology sector stock during the SARS outbreak. However, this research does not support Chen et al. (2007) and Pendell and Cho (2013), who found negative reactions during the outbreak.

Based on daily observation, the data shows that secondary and tertiary sector stocks had no difference in abnormal return around the event of the announcement of Coronavirus as a global emergency. The results of primary, secondary, and tertiary sectors data which are taken by monthly observation, are the same. The results

show that there is no difference in abnormal return on all sector stocks around the event of the announcement of Coronavirus as a global emergency.

If there is no difference in abnormal return around the time of the event, meaning that investors did not get shocked by the occurring event. In other words, investors had predicted, along with the spread of the information related to Coronavirus, from the first time it was discovered until it was announced by the World Health Organization as a global emergency. Thus, investors had predicted that there would be no market reaction, so they did not have high expectations on the total of received return as every decrease in actual return is followed by decreasing expected return.

b) The Event of the Announcement of Indonesia Citizens Infected with Coronavirus

The event of the announcement of Indonesia Citizens Infected with Coronavirus, which had occurred on the 2nd of March, 2020, is analysed as the data from daily observation. The results show that there is no difference in abnormal return on all sector stocks around the event of the announcement of Indonesia Citizens infected with Coronavirus. This means investors did not get shocked by the occurring event.

Before the event of the announcement of Indonesia citizens being infected with Coronavirus, the citizens have been informed, through the announcement of Coronavirus as a global emergency on the 30th of January, 2020, that Coronavirus is dangerous for public health in every country, which can result in an international outbreak. In other words, the citizens of Indonesia are also at risk of having infected with Coronavirus. This risk becomes the reason for investors in Indonesia to get prepared and take appropriate action before making a transaction in investments. As a result, there are Indonesian citizens infected with Coronavirus after 3 months of the announcement of Coronavirus as a global emergency, and this does not trigger a market reaction.

c) The Event of the Announcement of Coronavirus as National Disaster

The event of the announcement of Coronavirus as a national disaster that occurred on the 13th of March, 2020, is analysed as the data from daily observation. The results show that there is no difference in abnormal return on all sector stocks around the event of the announcement of Coronavirus as a national disaster. This means investors did not get shocked by the occurring event.

The absence of differences in abnormal return around the event of the announcement shows that there is no market reaction as investors had been prepared in making any investment transaction before any Indonesian citizens got infected by the virus. The same results are shown in the event of the announcement of Indonesia Citizens infected with Coronavirus, as it has occurred only in a short time interval, which further emphasises investors' preparedness in facing a pandemic situation in Indonesia. Furthermore, the issue about the Coronavirus vaccine, which is difficult to be mass-produced in a short time, also supports investors to take "wait and see" action, and this action does not cause any reaction from the market.

V. CONCLUSION AND RECOMMENDATION

A. Conclusion

Based on the data from daily observation, abnormal returns on primary sector stock differs positively and significantly around the announcement of Coronavirus as a global emergency on the 30th of January, 2020. Meanwhile, there was no difference in abnormal returns on secondary and tertiary sector stocks around that event. There is also no difference in abnormal return around the events of the announcement of Coronavirus as a global emergency based on the data from monthly observation, the announcement of Indonesia Citizens infected with Coronavirus on the 2nd of March, 2020 based on the data from daily observation, and the announcement of Coronavirus as a national disaster on the 13th of March, 2020 based on the data from daily observation. Thus, the results conclude that there is an increased market reaction only on primary sector stock around the announcement of Coronavirus as a global emergency based on the data from daily observation.

B. Recommendations

This research has its own limitations, namely the use of the market adjusted model in calculating abnormal returns. Therefore, the calculation used is only based on the Composite Stock Price Index. It is recommended that the next researchers use other calculation methods such as the market model and the mean-adjusted model as a comparison.

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