




An Analysis of the Influences of COVID-19 Pandemic on the Infrastructure Sector Price Index from March 1, 2021 - April 19th, 2022

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Abstract. This study aims to analyze the effect of the COVID-19 Pandemic on stock price performance based on the number of daily cases, the number of daily deaths, and the vaccination rate. Furthermore, this research was conducted on the Sectoral Price Index found on the Indonesia Stock Exchange (IDX), especially in the Infrastructure sector.

In this study, three independents were used such as the number of cases, the daily number of deaths, and the vaccination rate. This study shows that the effect between the Sectoral Price Index in form of the Jakarta Stock Industrial Classification (JASICA) and the number of daily cases, the number of daily deaths, and the vaccination rate is reciprocal. Moreover, based on the research it could have been known that both numbers of the daily case and daily deaths are having implications for the Sectoral Price Index, as well as the vaccination rate. Hence, the vaccination rate is having a 'hope' effect for investors and thus could bring positive sentiment towards the index.

In addition, previous research analyzes to determine the effect of the COVID-19 Pandemic on the Stock Market based on IDX mainboard data. The variables used to see the effect is daily cases of COVID, the daily number of deaths, and also social restrictions.

Keywords: COVID – 19 · Daily Cases · Deaths · Jakarta Stock Industrial Classification (JASICA) · Sectoral Price Index · Vaccination

1 Introduction

On March 11, 2020, the World Health Organization (WHO) in Kompas [1] declared COVID-19 as a global pandemic. The status was announced after the virus infected more than 121,000 people worldwide. Not only affecting the health sector, but other sectors were also shaken by this pandemic, for example, the tourism, industry, and retail sectors. COVID-19 was initially discovered in the city of Wuhan, China, and quickly spread to all corners of the world causing the disease to evolve from what was previously a regional crisis to a global pandemic, resulting in a significant decline in equities and increased market volatility. Market volatility is a statistically based measure of the dispersion of returns or returns on certain assets. Moreover, the price fluctuations in the stock market are one of the indicators used in financial system stability.

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R. Hurriyati et al. (Eds.): GCBME 2022, AEBMR 255, pp. 138–147, 2024.

https://doi.org/10.2991/978-94-6463-234-7_14

Nonetheless, the COVID-19 pandemic has had enough of an impact on the economy to threaten many countries with the threat of a recession. Indonesia itself in two consecutive quarters experienced a contraction of 5.32% [2]. However, based on the statement submitted in the article released by the Directorate General of State Assets (DJKN) in the first quarter of 2020 the national economy grew 2.97% which indicates a decline when compared to the first quarter of 2019 which was 5.07% due to the existence of the influence of COVID-19 from other countries that have economic activities with Indonesia or can be said to be an external influence.

Furthermore, in the second quarter, Indonesia is estimated to experience a contraction (negative economic growth) of around 3%. This is due to the social distancing policy in mid-March which will affect economic activity. However, this situation is better than other countries where several countries experienced more significant contractions such as Singapore which contracted by 41.2%, the United States experienced contraction by around 10%, and the UK by around 15%.

On the other hand, strengthening the economy must be carried out immediately, considering that many things must be addressed, such as health, economic recovery, and the provision of social funds which requires a lot of allocation. Moreover, the funds will be used for the development of health care infrastructure and economic support so that the economies of each country are not too shaken by the pandemic.

In another way, the infrastructure subsector would be affected by COVID-19. Thus, construction is not the only business activity under infrastructure that is being affected by COVID-19, but also toll roads, ports, airports, telecommunications, and transportation businesses. Most of the infrastructure sub-sectors affected by COVID-19 are engaged in the transportation sector, which of course experienced a decline in performance when compared to the previous year due to social restrictions that prohibit any activities from traveling outside the home to suppress a higher spread rate. However, the telecommunications industry which experienced demand for data during the pandemic also had to deal with declining sales due to the large number of people who lost their jobs and thus stopped the communication services they were using. Meanwhile, the construction sector itself experienced a significant decline during 2020, so it is estimated that growth will begin in 2021. The construction sector is stated to continue to experience contraction during 2020, wherein in the fourth quarter of 2020, this sector experienced a growth of minus 5.67%. Whereas previously the sector grew positively by 5.79%.

Through the explanation above, it can be seen that the construction industry itself needs time to recover from the impact of COVID-19 which has hampered the construction of several projects as the company's main business in the construction sector. It is expected that in 2021 the growth of building construction is estimated to reach Rp. 197.80 trillion, which was then supported by growth in the Housing and Industry sector. Referring to this optimism, construction companies need to determine the right strategy in dealing with the next wave of the COVID-19 pandemic so that their business can survive well.

Moreover, to support this research, below are the theory that used to develop the analysis.

1 Theory of Uncertainty in Investment

Pandemics are generally often associated with low demand and consumption because they are classified as unexpected events where people tend to reduce consumption so that events such as terrorism and the SARS pandemic have a severe impact on the economic and financial condition of individuals. Furthermore, concluded that times of stress and uncertainty can affect the volatility of the stock market. This is because during an unexpected event people cannot predict how the resolution of the incident will occur. Furthermore, the pandemic has proven capable of prompting a rapid shift in the focus of global financial markets.

2 Signaling theory

The signaling theory was first put forward where it was stated that signaling can be identified with the sending of a signal from the sender, which in this case is the owner of the information that describes the condition of a company that is useful for signal recipients, in this case, investors [3]. Signals received by investors can be divided into two, namely positive signals and negative signals where investors receive positive signals, investors will respond positively as well and will distinguish between quality companies and investment activities that can be carried out on it and vice versa [2].

3 Investment Behavior

is influenced by financial behavior where in theory, behavioral observations and psychological theories are carried out specifically to understand the role played by human behavior in making investment decisions. However, irrational behavior is often adopted by investors, which makes traditional financial theory irrelevant. Therefore, behavioral financial theory is one way to analyze the emotional characteristics of investors in unraveling subjective factors and irrational anomalies in the capital market. Because investor behavior occurs due to the information received by individuals as investors, it is very likely that for each information received there will be differences in the resulting reactions.

From the theories above, we could conclude that the pandemic actually has something to do with price indexes because once the market is getting impacted by the pandemic, it would also give a signal to investors which later affecting on their investing behavior.

1.1 Hypothesis

During the COVID-19 pandemic, there was uncertainty was also felt by almost all economic actors, including the community, government, and the private sector. This certainly affects the investment activities that are generally carried out. Investment is basically a form of commitment to existing funds in an effort to anticipate an increase in the yield of funds at certain times [4]. One form of investment that is commonly carried out by the community is investment activities, both directly and indirectly so that profits are obtained from these activities. The COVID-19 pandemic will inevitably affect people's behavior in making investments. This is of course due to the greater risk that accompanies these investment activities.

The increased risk is due to uncertainty in investment activities caused by the COVID-19 pandemic where when stress and uncertainty occur, this will affect the volatility of the stock market. One form of stress that arises is the wave of layoffs during the pandemic,

especially in certain sectors, the uncertainty of when the vaccine will be available, as well as the presence of a new variant of the virus which also adds to the uncertainty and stress that occurs. In the absence of such certainty, people cannot predict how the resolution of the incident will occur.

To be able to invest in financial products, especially in the stock market, requires a high level of involvement. This is because while in the process of determining investment, it is generally influenced by the uncertainty and complexity of the results. In addition, the traditional theory of investment decision-making also states that investment activities are built on the belief in rationality and self-interest. In the context of financial market investment, decision rationality involves the behavior of economic actors, which indicates that investors cannot make rational decisions during times of uncertainty.

Therefore, the following is a hypothesis in this study:

H1: There is an impact between the number of COVID cases on the stock price of the infrastructure sector.

H2: There is an impact on the number of deaths per day on the share price of the infrastructure sector.

H3: There is an impact of the vaccination rate on the share price of the infrastructure sector.

2 Methods

2.1 Data

The data used in this study were obtained in two ways, namely through:

1 Literature Study

Literature study is a way of collecting data by searching for and studying books, scientific literature, journals, and articles carried out in order to obtain information and theories used for research basis.

2 Field Study

Field studies are secondary data collection. Researchers used secondary data in the form of Composite Stock Price Index (CSPI) data for the Infrastructure sector on the Indonesia StockExchange (IDX) in the period December 2019 – 2021, which was obtained through the IDX website.

2.2 Research Methodology

Given that the data to be used are time series, what will be done is to perform multiple linear regression on the available data. To examine the impact of the COVID- 19 pandemic on the JCI in the infrastructure sector, this study refers to research conducted by Anh and Gan [5], Al-Awadhi, Alsaifi, Al-Awadhi, and Alhammidi [6], and Ashraf [7] and Utomo and Hanggraeni [8] which is a method used to evaluate the impact of new confirmed cases and deaths of COVID-19 on daily stock returns. In addition, this study adds a vaccination variable to see whether vaccination is able to give confidence to the public so that it affects investor sentiment towards the stock market, especially in the infrastructure sector.

3 Result and Discussion

In Indonesia itself, the wave of COVID-19 generally occurs in two waves, namely the first wave in the period November 2020 - January 2021, and the second wave which occurs in May 2021. The first wave of COVID- 19 occurs due to high community mobility during the Christmas holiday and New Year 2020. Of course, for the community to limit themselves during the holiday period is quite difficult because in previous years holidays occurred normally and people had planned the 2020 holiday in advance.

Due to the occurrence of the first wave of COVID- 19, the Government implemented a strict PSBB on September 14 – October 11, 2020, followed by October 12, 2020 – January 10, 2021. Furthermore, the second wave occurred in May 2021 when the outbreak of COVID-19 again increased after the holiday Eid and the rapid spread of the COVID-19 delta variant. The number of cases of COVID -19 continues to increase from March 2nd, 2020 – December 2nd, 2021. Moreover, the data below shows linear results as the conclusion above where the spread of COVID – 19 has been split into two waves as 1st and 2nd waves. Figure 1 show Daily Cases Rate Due to Covid - 19 per Day (2 March 2020 - 2 december 2021) as follow.

Figure 2 show Daily Death Rate Due to Covid - 19 per Day (2 March 2020 - 2 December 2021) as follow.

The number of cases is also in line with the increase in the number of deaths due to COVID-19. It can be seen that the peak daily death rate increased from November 2020 to its peak in February 2021, which was then followed by an increase in the second wave in June 2021 to its peak in August 2021.



Fig. 1. Daily Cases Rate Due to Covid - 19 per Day (2 March 2020 - 2 December 2021)

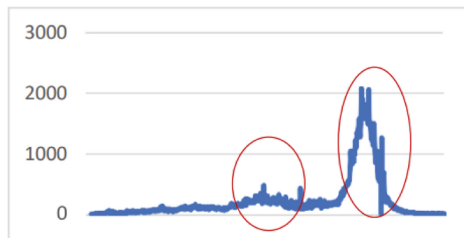


Fig. 2. Daily Death Rate Due to Covid - 19 per Day (2 March 2020 - 2 December 2021)

Thus, even though the existence of social restrictions will certainly have an impact on the industry. This is in line with the findings that have been researched by the Central Statistics Agency/Badan Pusat Statistik (BPS) [9] where it is stated that the COVID-19 pandemic affects several business sectors such as accommodation and food and drink, other services, transportation and warehousing, construction, processing industries, and trade. Furthermore, referring to the 11 sectors referred to by the IDX, the sectors that may be affected by COVID-19 include the basic materials, cyclical consumer, non-cyclical consumer, industrial, transportation and logistics, property, and construction sectors.

The movement of the economy itself generally goes in accordance with the growth of infrastructure. However, due to the COVID-19 Pandemic, the Government of Indonesia carried out several strategies in order to maintain economic growth in 2021. One of the strategies carried out was to continue the National Economic Recovery Program (PEN). The State Revenue and Expenditure Budget (APBN) will be more pursued to meet spending needs.

This is in line with the plan from the Ministry of Public Works and Public Housing (PUPR) which continues to strive to maintain the sustainability of infrastructure projects in the midst of the COVID-19 pandemic where the type of infrastructure that will be pursued for sustainable development is the infrastructure that is able to support national economic recovery, namely infrastructure supporting connectivity such as roads and bridges that are useful for the smooth distribution of logistics and connectivity between regions.

However, with the existence of regulations related to limiting activities in the context of suppressing the number of cases and deaths due to COVID-19, of course, this is an obstacle for infrastructure development. This is certainly a separate consideration for investors to invest in this infrastructure sector. These considerations, of course, can be influenced by the daily case rate, death rate, and vaccination. Where the lower the daily number of cases and the death rate due to COVID-19 will give a positive reaction, as well as a high number of vaccinations. Table 1 show variables entered/removed^a as follow.

Table 2 show model summary^b as follow:

The table above shows the coefficient of determination which is denoted by the symbol R^2 which indicates that there is a contribution from the independent or independent variable to the dependent or dependent variable together. In the table, it can be seen that the value of R^2 is 0.574 which shows that the three independent variables have a significant effect on the dependent variable. Table 3 show coefficients^a as follow:

In addition, in the table above, it can be concluded that both the number of COVID-19 cases, daily deaths, and the third vaccination have a significant effect on the Infrastructure Sectoral Price Index.

Table 1. Variable Entered/Removed

Model	Variables Entered	Variables Removed	Methods
1	Vac _b Death, Cov	-	Enter

a. Dependent Variable: IHSG_Infra

b. All requested variables entered.

Table 2. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.757 ^a	.574	.570	27.59908

a. Predictors: (Constant), Vac, Death, Cov

b. Dependent Variable: IHSG_Infra

Table 3. Coefficcients

Model		Unstandardized B	Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	901.699	2.687		335.585	.000
	Cov	-.001	.000	-.240	-3.181	.002
	Death	.003	.007	.035	.476	.635
	Vac	8.789E-5	.000	.678	17.739	.000

a. Dependent Variable: IHSG_Infra

While the regression equation itself is:

$$INFRit = \beta 0 + \beta 1Casesit + \beta 2Deathit + \beta 3Vaccinesit + \varepsilon it \tag{1}$$

when combined with the results of the whole, the following model will be formed:

$$INFRit = 901.699 - (0.001.Cases) + (0.003.Death) + (8.78.Vaccines) \tag{2}$$

Investment is basically a form of commitment to funds which includes anticipating efforts to increase yields at certain times. So, for these investment activities, investors generally expect returns or profits from these activities.

With the entry of the COVID-19 outbreak into Indonesia, investors will get a bad ‘signal’ from the economy. The existence of this signal arises because of the uncertainty that arises as a result of the incident. This is in accordance with what was conveyed by Da et al. which stated that times of stress and uncertainty can affect the volatility of the stock market. This is because during an unexpected event people cannot predict how the resolution of the incident will occur. During the COVID-19 pandemic, of course, no one can predict how the pandemic will end. Not to mention, the absence of a vaccine for the disease has caused this pandemic to create a tense atmosphere that causes it to be unpredictable when the virus will be able to stop its spread.

Therefore, the pandemic has proven to be able to encourage a faster turnaround in the focus of global financial markets. This is due to fear and uncertainty, that in times of uncertainty, investors become worried and tend to sell their shares spontaneously to avoid future losses. This is in line with the behavior of an investor where when conducting investment activities, decision-making is generally influenced by the uncertainty and complexity of the results so investment decision-making also states that investment

activities are built on the belief in rationality and self-interest. Under these conditions, investors try to behave rationally and analyze what factors might give reasons for their actions in investing.

In this case, vaccination is one of the factors that can give investors hope' to be able to carry out investment activities. This is in accordance with the findings above, that vaccination has a significant effect. Likewise, two other factors, namely, deaths and daily cases also have a significant effect. Where, the decreasing number of deaths and daily cases, then this will give a 'signal' to investors that conditions will return to normal soon. A very important signal, especially for investors. The signals received by investors will then be translated into their actions in making investments and in making investment decisions. This signal can be in the form of various information received by investors before making investment activities or in making decisions related to investment. In this case, the signal can be in the form of information related to finance or news circulating to the general public.

Moreover, it was found in previous research that the state of mind that occurs in buyers and sellers in the financial market will trigger 'risk on' and 'risk off' on a regular basis. Where in this case, the information that is dynamics related to the COVID-19 pandemic is able to dynamically change investors' sentiments. The facts on the ground are also consistent with the statement made by Bae and Karolyi where negative news, in this case, foreign news, affects stock prices more significantly than good news.

The development of news related to COVID-19 of course also received various responses, both from economic actors, the community, business people, and the government because the pandemic will certainly affect the economy in various countries, both developing and developed countries. This is similar to the research conducted by Ichev and Marinic who conducted research on the Ebola outbreak [6]. In this study, it was found that information in the form of media coverage affects people's feelings which then causes anxiety and fear that it affects investors' decisions. This is known as investment behavior.

Investment behavior is influenced by financial behavior where in theory, behavioral observations and psychological theories are carried out specifically to understand the role played by human behavior in making investment decisions so that it can explain stock price fluctuations that cannot be explained by traditional financial theory. In traditional financial theory in general, investors are assumed to be decision makers who behave rationally in their investment activities, where investors are considered to analyze all information to be processed rationally before investing activities.

However, irrational behavior is often taken by investors, which makes traditional financial theory irrelevant. Therefore, behavioral financial theory is one way to analyze the emotional characteristics of investors in unraveling subjective factors and irrational anomalies in the capital market. Because investor behavior occurs due to the information received by individuals as investors, it is very likely that for each information received there are differences in the resulting reactions. Therefore, these three variables have an influence on the Sectoral Price Index even though the resulting reactions are different. In other words, with an increase in cases, investors will tend to do rash activities and withdraw their investment. However, on the other hand, an increase in vaccination rates will increase the level of hope for investors or in other words increase market confidence.

4 Conclusion

The study was conducted in order to analyze the effect of daily COVID-19 cases, death rates, and vaccination rates on the performance of the stock market which is under the infrastructure sector. The research was conducted on the Infrastructure Sector Price Index. The following are the results of the research there's an influence on the daily number of COVID-19 cases and daily death cases that give a negative signal for investors to be able to carry out investment activities in this field. Nevertheless, the existence of several incentives can provide a good 'signal' to investors. Moreover, the number of vaccinations could affect the performance of the stock market in the infrastructure sector where vaccination is able to provide market confidence and provide a positive 'signal' to investors.

Based on the conclusion above, the suggestion was for Government and the Community must work together so that efforts to suppress cases and deaths due to COVID-19 can run smoothly. Where policies that are designed to reduce cases and deaths due to COVID are able to protect stock market performance so that they are not too affected. This is because investors have begun to feel the certainty associated with the end of the COVID-19 pandemic.

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