

**IMPACT OF COVID-19 PANDEMIC AND VACCINE INFORMATION
TO STOCK RETURNS AND VOLATILITY IN INDONESIA****Agus Diemas Prayoga, Sung Suk Kim**

Universitas Pelita Harapan

ARTICLE INFO

Keywords: *COVID19, Google search volume Index, stock market volatility*

Kata Kunci: COVID 19, Indeks volume pencarian Google, volatilitas pasar saham

Corresponding author:

Sung Suk Kim
sungsuk.kim@uph.edu

Abstract. *This study was conducted to investigate how investor attention affects COVID 19 outbreak information and vaccines on stock returns and Indonesian stock market volatility. We used the Google Search Volume Index to measure outbreak information and investor attention to the COVID19 vaccine. The empirical results obtained showed that the search volume associated with COVID19 outbreak information had a negative impact on the return on days, and conversely the presence of COVID19 vaccine information had a positive impact. In addition, this study examined in relation to stock market volatility, denying that COVID19 outbreak information causes excessive volatility in the market in inverse proportion to COVID19 vaccine information that actually reduces market volatility. We conclude that it provides a positive feeling.*

Abstrak: Penelitian ini dilakukan untuk mengetahui bagaimana perhatian investor mempengaruhi informasi wabah COVID 19 dan vaksin terhadap return saham dan volatilitas pasar saham Indonesia. Kami menggunakan Indeks Volume Penelusuran Google untuk mengukur informasi wabah dan perhatian investor terhadap vaksin COVID19. Hasil empiris yang diperoleh menunjukkan bahwa volume pencarian terkait informasi wabah COVID19 berdampak negatif terhadap return on days, dan sebaliknya keberadaan informasi vaksin COVID19 berdampak positif. Selain itu, penelitian ini mengkaji dalam kaitannya dengan volatilitas pasar saham, menyangkal bahwa informasi wabah COVID19 menyebabkan volatilitas yang berlebihan di pasar berbanding terbalik dengan informasi vaksin COVID19 yang justru mengurangi volatilitas pasar. Kami menyimpulkan bahwa itu memberikan perasaan positif.

INTRODUCTION

The emergence of the COVID-19 virus, which was first detected in Wuhan in early December 2019, has had a huge impact not only on people's lives but has also changed the world economic order (Zandi et al., 2020). Not only has it had a worrying impact on human health but the COVID-19 pandemic has also had a major impact on the economic life of the world community. In Indonesia itself, since the announcement of the first case of COVID-19 by President Jokowi in early March 2020 has shocked the public and also brought a very significant influence on the Indonesian economy and caused the destruction of the Indonesian capital market (Sugianto, 2020). Not to mention the World Health Organization (WHO) on March 11, 2020 has declared the new coronavirus outbreak (COVID-19) as a global pandemic (Cucinotta & Vanelli, 2020). This certainly makes the public more worried and also provides a sense of worry for investors in running their business in this pandemic period.

The rapid spread of the corona virus (COVID-19) has had a dramatic impact on financial markets around the world (Zhang et al., 2020). In Indonesia itself, especially in some major cities, many measures are implemented by the government to break the chain of spread of COVID-19. For example, large-scale social restrictions implemented by the government that cause restrictions on human movement to perform business or school activities. This move almost crippled the economy in Indonesia. In addition, resorts, entertainment centers, restaurants, shopping malls, and even entrances to Indonesia for foreigners have been closed by the government to prevent the spread of COVID 19. Not only the tourism sector is worst affected by the closure of the entrance to Indonesia, the business and financial sectors are also affected considering that it limits the movement of business planning that has been planned at the beginning of the year for both investors and business people. This condition certainly makes investors must always monitor information on the development of the spread of COVID-19 continuously, and look for loopholes for the continuation and smoothness of their business. At all times, every news development and every information conveyed either by the Indonesian government or world news certainly becomes very important for investors to determine the next step in this pandemic period, whether they have to wait, advance or even survive.

But then, entering the beginning of 2021, the fresh wind of news regarding the entry of vaccines into Indonesia again became the attention of investors (Putra, 2020). Starting from the vaccination received by President Jokowi on January 13, 2021, then followed by several Indonesian figures or artists and then continued with the provision of vaccines to the workforce is expected to help Indonesia to immediately overcome COVID-19. Not only that, of course, the government also has the goal to immediately restore the economy. Minister of Investment / Head of Investment Coordinating Board (BKPM) Bahlil Lahadalia hopes that the inclusion of this vaccine can make investors more confident to invest (BKPM, 2020).

The conditions and picture of the circumstances described above are what prompted this research to be done. The research will examine how investor attention to the development of the COVID-19 pandemic can affect daily returns as well as the volatility of the composite stock price index specifically on the Indonesia Stock Exchange.

Previous research (Chundakkadan & Nedumparambil, 2021) found very strong associations in 59 countries. Showed that paying attention to the COVID-19 virus could create a generally negative mood among market participants and lead to a stock market recession. Researchers also found that this effect had a stronger effect during the week when COVID-19 was declared a pandemic. The study also found that the inverse relationship between revenue search volumes was more pronounced in developed countries. In addition, researchers looked at the relationship between search volume and stock market volatility and found that pandemic sentiment led to excessive stock market volatility.

In the study, Indonesia was included as one of the countries studied, but the time of the study only took place in the period 1 February to 30 April 2020, which can be said to be too short from the distance since the announcement of the first COVID-19 case in Indonesia, so there is information that may not

be able to describe the real state of Indonesia. So this research will try to develop the research time period to be longer, namely until the end of September 2021 and to develop research by including additional variables, namely information on COVID-19, by looking at whether information on vaccine use in Indonesia has an influence on stock returns and the level of stock volatility in Indonesia. To our knowledge, this is the first time researching the effect of vaccination on the same return and volatility of stocks in Indonesia.

Again reminded, the following part of the discussion of this journal is the discussion of library reviews, then continued with the presentation of data in research and empirical methods formed then followed by the discussion of research results and will be closed with conclusions from research results.

LITERATURE REVIEW

2.1. Effect of COVID-19 Information and COVID-19 Vaccine on Stock Return

The COVID 19 pandemic is not the first pandemic and is known to threaten public health around the world, but pandemics such as the outbreak of black death, the Spanish influenza virus, MERS, bird flu, SARS, and Ebola. Was known in advance that it occurred once. Endangers human health. It is well known that the plague outbreak kills almost one-third of Europe's population, and that plague outbreaks also affect the economic aspects of Europe. (Alfani & Murphy, 2017). Then another deadly virus, the Ebola virus that occurred in West Africa, especially Liberia, then spread to several countries. De La Fuente et al. (2019) discovering how the Ebola epidemic dealt a severe blow to Liberia, with high deaths causing greater disruption to the mobilization of labor groups to plant and harvest, thereby reducing rice planting area as well as rice yields. Then Kentikelenis et al. (2015) discussed also how the Ebola epidemic that occurred caused Guinea, Liberia and Syria into economic downturn so that the IMF intervened to provide assistance to help the recovery of the economy.

However, the arrival of the first COVID-19 virus vaccine in early 2021 is expected to bring fresh air to recovery, normalization and stability of the economy and stock market. It is hoped that the arrival of vaccines can bring another impact on the economy may even have a positive impact on the stock market. This is of course because the vaccine will allow the economy to move out of various restrictions and lockdowns due to COVID-19. It can be seen from some of the hardest hit countries such as China, the country of origin of COVID-19 which can be said to have managed to control COVID-19 much more effectively than other countries.

2.1.1 Spread of COVID-19 Information on Stock Returns

As is known that the COVID-19 pandemic has caused a feeling of fear for investors and provided a negative outlook that can give a confectioneer to the rate of return on shares because investors are very sensitive and do not like an uncertainty. Investors will try to cover up the fear of the conditions that occur by looking for news related to the COVID-19 pandemic. Of course, this is done by investors to answer the questions posed by their fear of uncertain conditions. Fama & Malkiel (1970) provides a simple answer that influences stock market movements. This is the claim that the stock market catches up with investors quickly and efficiently. Therefore, when a new message appears on the market, investors can react quickly to that information and reflect that reaction in the stock price.

Research related to financial behavior is research on the relationship between investor sentiment and the stock market, Da et al (2011) also sought to ensure that mood could be expressed at the market level by using the daily internet search volume of millions of households. A combination of questions related to budget issues such as recession, unemployment, and bankruptcy provides a benchmark for investor sentiment as it relates to financial and economic issues. Bank et al. (2011) in his research how increased news search volume on Google affects liquidity and higher temporary returns in the future. It's no different than Joseph et al. (2011) examined how online news search capabilities can affect abnormal stock returns and trading volume. They found that the intensity of online news searches could predict

abnormal stock returns and trading volume, and the sensitivity of returns on stocks arbitrated in a sample of S&P 500 companies. Thus, researchers in this case form the following hypothesis:

H1: COVID-19 information has a negative impact on stock returns.

2.1.2 Spread of Vaccination Information Against Stock Returns

Vaccination information is expected to change views and reduce the fear felt by previous investors over the COVID-19 pandemic. It is expected that investors views will be more optimistic about the stock market and have a positive impact on the rate of return on stocks.

To our knowledge, there is still very little research on the effect of the COVID-19 vaccine on stock returns. Acharya et al. (2020) develop research on asset pricing prospects for measuring healing value through editing the Vaccine Progress Indicator. Their study predicts that stock market returns will increase by about 4% to 8% per day as the expected diffusion period of vaccines declines each year.

Hong et al. (2021), through their research, they formulated a model for pandemic risk management and business valuation. The results suggest that a temporary higher risk of a vaccine's arrival will trigger the scale of pandemic shocks. Asset valuations become very sensitive to the speed at which a vaccine emerges. The arrival of this vaccine would then move stock price volatility to pre-pandemic levels. Thus, the next hypothesis formed in this study is as follows:

H2: Vaccines have a positive impact on stock returns.

2.2 Effect of COVID-19 Information and COVID-19 Vaccine on Stock Volatility

As discussed earlier, it is believed that news of the COVID-19 pandemic raises fears for investors and gives a negative view of the stock market which will ultimately also cause very sensitive market volatility because investors do not like the uncertainty over the conditions of the COVID-19 pandemic. Tetlock (2007) through his research, measured the interaction between the daily Wall Street Journal content and the stock market and found that media pessimism drives up sentiment. negative for market prices, followed by a return to fundamentals and particularly high or low pessimistic projections. high trading volume in the market. Antweiler & Frank (2004) examined how communitarians in the Yahoo! Finance communication space can influence stock market movements, especially the 45 companies in the Dow Jones, where news from the Wall Street Journal is used as a controller of emotional investors. Research has found that information about stocks helps predict market volume.

In a behavioral economics study, Kaplanski & Levy (2010) showed that negative emotions caused by mood and fear can influence investment decisions and thus asset prices. In this study, we tested the impact of a plane crash on stock prices. Studies show that the impact is greater for small, high-risk equities and companies in less stable industries. The impact of these events is also associated with an increased perceived risk. Implied volatility increases after a plane crash, without an increase in actual volatility.

Further research in this study aims to clarify how COVID-19 pandemic sentiment is associated with Indonesian market volatility. Consistent with the sentiment sensitivity hypothesis, this study provides strong evidence of the impact of pandemics on the stock market through investor sentiment using the latest literature. These results are consistent with existing research that claims that investor sentiment plays an important role in the market. ((Baker & wurgler, 2007), (Hirshleifer et al., 2020), and (Stambaugh et al., 2012)).

2.2.1. Spread of COVID-19 Information on Stock Volatility

It is very important to better understand the impact of investor fear in Indonesia on stock market volatility during the COVID19 pandemic, as the alleged COVID19 pandemic has scared investors. fear due to uncertainty and this fear will also bring about negative feelings. for stock market operations. The aftermath of the COVID19 pandemic has confirmed that financial markets have experienced

dramatic volatility, and the stock market reaction to the COVID-19 pandemic announcement causes uncertainty and leads to losses. economy. This has made the market very volatile and unpredictable.

The next research is to further investigate how the relationship between the level of information search or the volume of news searches about the COVID-19 pandemic to volatility in the Indonesian stock market. Previous research (Long et al., 1990) showed that sentiment-based trading decisions can cause trading to become volatile and excessive volatility in the stock market. Latoeiro et al. (2013) in his research, provided detailed evidence that an increase in searches for stocks in the Google search engine was followed by a temporary increase in volatility, volume, and a decrease in profits accumulation. In addition, high search volume on market indices leads to decreased returns on index and stock index futures resulting in increased implied volatility. Thus considering the relationship and by referring to some existing literature, the researchers form the next hypothesis, namely:

H3: COVID-19 information has a positive impact on stock volatility.

2.2.2. Spread of COVID-19 Vaccine Information in Stock Volatility

At the beginning of discussions about the COVID-19 vaccine has been developed, many people doubt the effectiveness of the vaccine. However, in line with the development of the spread of the COVID-19 virus that continues to grow, finally the community is starting to be optimistic to support the success of COVID-19 can help the global recovery of the COVID-19 pandemic. This is certainly also a concern for investors, they continue to observe how the development of COVID-19. As previously stated, there is still little research on the COVID-19 vaccine. Acharya et al. (2020) in his research, exploring how successful vaccination programs can affect global wealth. In addition, in research conducted by Rouatbi et al. (2021) also said that the existence of mass vaccination activities will certainly help stabilize global equity markets. But as far as we know, how the role of vaccine information to market volatility globally until now there has been no detailed research.

The results of the European Central Bank survey (Grab et al., 2021) through its research journal, found that news of the decline of vaccine shipments in Europe, created some volatility in probability indicators. The impact can be said to provide surprises for some segments of financial markets and provide monetary pressure and market pressure. So, the next researcher developed the following hypothesis:

H4: COVID-19 vaccine information negatively affects stock volatility.

DATA AND RESEARCH MODELS

3.1 Research Data

To further look for the influence of investor attention on COVID-19 outbreak and vaccine information as well as behavior from stock market participants, the study used individual stock price index data from companies that listed on Indonesia Stock Exchange. Of the 759 listed companies, there are 15 companies that are no longer active and 81 companies whose IPO period after the first Indonesia's COVID-19 case was announced, bringing the total number of companies used in this study is 663 companies spread from all industries. The individual stock price index data on Indonesia Stock Exchange was obtained from <https://finance.yahoo.com/> for the period march 2, 2020 - September 30, 2021 which in that period amounted to 383 trading days. The election period is the date since the announcement of the first Indonesia's COVID-19 case which was announced by Pak Jokowi the President of Indonesia up to 1.5 years after.

While data on investor attention to information about the pandemic and the COVID-19 vaccine was using Google Search Volume Index (GSVI) which is from <https://trends.google.com/>. Google information search website is one of the search engines that are widely used when we want to search for various information in cyberspace (Aida, 2020). In financial literature, GSVI is commonly used to

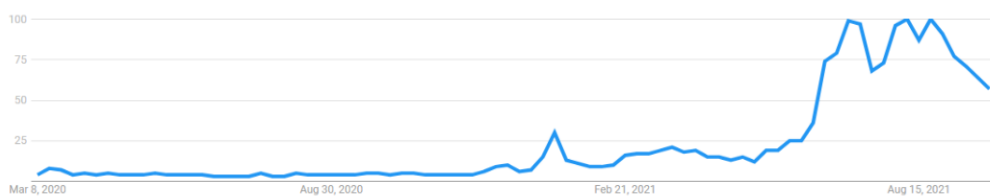
predict stock's returns and volatility (Heyman et al., 2019; Kim et al., 2019; Vlastakis & Markellos, 2012).

In this study, the keywords used in Google web searches were "Covid+ coronavirus + covid-19 + delta" and "vaccine + stage 1 / stage 2 + dose 1 / dose 2 + az seneca + pfiser + sinovac + sinopharm + moderna" as the keywords of investor attention to pandemic information and the COVID-19 vaccine which will then be associated with behavior in the stock market. Website searches related to the COVID-19 pandemic and vaccine for both stage 1 and stage 2 became the most sought-after trend after the outbreak of COVID-19 to date where the distribution of vaccines, in (Figure 1) for keywords related to the COVID-19 pandemic seen in the early period of March 2020 it appears that there is a very high number of searches, This period is the period where on March 2, 2020 is when the first COVID-19 cases in Indonesia were announced by President Jokowi, as well as who's statement that Covid-19 is a pandemic. In addition, for 2 keywords related to the COVID-19 vaccine, there has also been an increase in the number of disbursements since 2021, due to the start of the vaccine distribution process carried out by the Indonesian government.

Keyword 1: "covid + coronavirus + covid-19 + delta"



Keyword 2: "vaccine+ stage 1 / stage 2 + dose 1 + az seneca + pfiser + sinovac + sinopharm + moderna"



Search

Source: Google trends

Image 1:
topics on Google.

The GSVI data provided by Google Trends is a daily search index, not an absolute search volume. This is a value based on the total number of searches on Google for a particular topic search and the corresponding time interval. This relative value is further normalized so that the GSVI value is in the range 0-100. A GSVI score of 100 corresponds to the highest relative volume and indicates the peak popularity of the term being searched for, with 0 indicating insufficient data for the term being searched. Therefore, GSVI allows researchers to measure the interest of news searchers (in this case investors) on specific topics related to pandemics and the COVID19 vaccine. In this survey, the geographic location of the search source was also limited to searching in Indonesia. This is considered one of the most commonly used indicators to attract the attention of investors. (see Da et al. (2011)).

3.2 Empirical Model

3.2.1 Empirical Model of Information Dissemination & COVID-19 Vaccine Against Stock Return

The first step in this study is to test whether information about the pandemic and the COVID-19 vaccine can affect the daily return rate of individual company shares in Indonesia. If the information has a negative sentiment impact, then the daily return of the company's individual shares should have a negative correlation to search volume. However, if pandemic information or the COVID-19 vaccine

does not affect investor mood or anxiety, nor does it leave an influence on market sentiment, then it can be said that there is no statistically significant relationship between the daily returns of individual stocks and search volume.

To test how pandemic information and the COVID-19 vaccine affect the returns on individual company shares, we estimate a model similar to the model previously used by Kaplanski & Levy (2010), namely:

$$R_{it} - rf_{it} = \alpha + \beta_1 GVSI Covid_t + \beta_2 GVSI Vaksin_t + \beta_3 (Rm_t - rf_t) + \beta_4 (B/M)_{it} + \beta_5 Size_{it} + \beta_6 Mon_{it} + \varepsilon_{it} \quad (1)$$

where $R_{it} - rf$ is the daily rate of return of the company's individual shares in Indonesia at time t . And the variable control is, market return $(Rm - rf)_t$, *book to market* ratio (B/M) which is the book price divided by the stock price in the market, size of the company (*Size*) as measured by the market cap, namely the number of shares outstanding multiplied by the stock price and momentum (*Mon*) (Carhart, 1997) which is short-term reversal or return cumulative from 5 days earlier $(R_{i,t-1})$. ($GVSI Covid_t$) is the search volume index for *covid + coronavirus* keywords in Indonesia at time t . ($GVSI Vaksin_t$) is the search volume index for *Covid Vaccine* keywords in Indonesia at t .

Fama & French (1993) argues that the risk of investing in common stock can be shaped more simply as a risk associated with the market, the size of the company, and the *book-to-market* ratio of the company. The study measured all three types of risk using estimated coefficients on the return on market excess $(Rm_t - Rf_t)$, the size of the investment portfolio (SMB_t), and the *book to market* (HML_t) investment portfolio of three-factor regression.

3.2.2 Empirical Model of Information Dissemination & COVID-19 Vaccine Against Stock Volatility

Because it has been observed that the COVID-19 pandemic and vaccine can create negative sentiment among market participants, which can affect stock markets around the world drastically, the next step taken in this study is to examine whether this COVID-19 information and vaccine can provide excessive volatility in the Indonesian stock market.

Previous research has said that one of the other important elements that interests investors is market volatility, which highlights that negative mood market participants can result in excessive volatility in the stock market (Da et al., 2015).

3.3 Variable Operationalization

The focus of the study was to examine how sentiment from pandemic information and the COVID-19 vaccine affects daily returns and volatility of individual company stock price indices on the Indonesia Stock Exchange. So the bound variables used are 'Daily Returns' and 'Volatility'.

Daily returns are calculated based on the difference in the value of today's adjusted closed index with the previous day. As for stock market's Daily Volatility, this study uses a measure once proposed by Garman & Klass (1980), in previous research, namely:

$$Vol_{i,t} = 0.511 \ln \left(\frac{h_{i,t}}{l_{i,t}} \right) - 0.019 \left[\ln \left(\frac{c_{i,t}}{o_{i,t}} \right) \ln \left(\frac{h_{i,t} l_{i,t}}{o_{i,t}^2} \right) - 2 \ln \left(\frac{h_{i,t}}{o_{i,t}} \right) \ln \left(\frac{l_{i,t}}{o_{i,t}} \right) \right] - 0.383 \left[\ln \left(\frac{c_{i,t}}{o_{i,t}} \right) \right]^2 \quad (2)$$

where $Vol_{i,t}$ is the volatility of the i -th stock market at time t . While h , l , o , and c are the highest, lowest, opening, and closing prices.

RESULTS

4.1. Descriptive Statistics

Table 1 – Descriptive Statistics

| Variable | Obs | Mean | Std. dev. | Min | Max |
|--------------|-------------|--------------|--------------|------------------|-------------|
| Return | 253.92 9 | 0,00078 | 0,03648 | - 0,0689 7 | 0,1803 3 |
| DailyVol | 253.92 9 | 0,02068 | 0,02294 | 0 | 0,1151 2 |
| MarketReturn | 253.92 9 | 0,00048 | 0,01451 | - 0,0657 9 | 0,1019 1 |
| Momentum | 253.92 9 | 0,00450 | 0,08354 | - 0,2293 6 | 0,3875 0 |
| MarketCap | 253.92 9 | 3,09834 | 0,83281 | 0,8513 7 | 5,9568 7 |
| BMRatio | 253.92 9 | 0,89193 | 0,79497 | 0,0568 0 | 4,1619 6 |
| GsviCovid | 253.92 9 | 37,6971 3 | 15,6620 0 | 5 | 100 |
| GsviVaksin | 253.92 9 | 15,8537 9 | 17,0800 8 | 0 | 88 |

Table 1 reports descriptive statistics of each variable used from dependent variables to their control variables. The table shows that the average daily *return* generated is relatively small with a large maximum and minimum value, which is because the period used in this study is the COVID-19 period, which starts from March 2, 2020 to September 30, 2021, which is also shown from the large standard deviation value. In addition, the difference in maximum *return* and minimum return is too far, so it can be said that market fluctuations in that period are indeed very large.

Table 1 also addressed GSVI which is a daily search index for outbreak-related keywords and the COVID-19 vaccine, where the value is based on a topic search on Google in time intervals according to the study period. GSVI values are normalized values so GSVI values range between 0 and 100, where a value of 100 indicates the highest search peak for that keyword, and 0 indicates the absence of searches for those keywords. For the GSVI Covid index, the minimum value is 5, which is the period when COVID-19 cases are few and people are not very concerned about it, and while the maximum value is 100 which is what happens when in the early months when COVID-19 cases in Indonesia begin to surge where at that time the majority of citizens simultaneously find out things related to the pandemic. That then had a decline until finally the search increased again when delta cases began to be found. As for the GSVI Vaccine index itself which initially searched for a little and even the minimum value was 0 when the initial case, and until finally the search began to surge to reach a maximum value of 88 when the Indonesian government began to conduct a mass vaccination program for the community.

4.2. Covid-19 Outbreak and Vaccine Information Against Return and Volatility

To see the influence of information related to the Covid-19 Outbreak and Vaccine on the Indonesian stock market, the *Hausman Test* is processed to determine which regression model is suitable from the data currently used in the study, and the results show that *Fixed-Effect* model more suitable for the data. Then to make sure that the regression model is right, the *Redundant Fixed-Effect Test* is carried out which aims to ascertain whether the panel data used is a different individual or the same, and the results show that the individual of the panel data used is actually a different individual, so that the model to be used is *Fixed-Effect* type. In the process of processing data has also previously been done testing classical assumptions where then the violation of classical assumptions of autocorrelation and heteroscedasticity has been handled using *Robust Regression*.

4.2.1. Effect of Outbreak Information and Covid-19 Vaccine on Return

Table 2 shows the results of data processing to see the effect of independent variables on the rate of *return* of shares. In the process, there are 3 stages of regression where for the first regression the results are seen that the level of search volume related to COVID-19 outbreak information (GSVI Covid) has a coefficient that is negative and statistically significant. These findings show that information about the COVID-19 outbreak is really affecting the performance of the stock market in Indonesia, where the influence given is negative so that the greater the level of public concern for the information of the COVID-19 outbreak is said to make the rate of return in the stock market decrease. Therefore, as already hypothesized in hypothesis 1 previously, it is proven that the information of the COVID-19 outbreak has generated negative sentiment in the market and as a consequence performance in the stock market has decreased.

In addition, table 2 for the second regression is also addressed how vaccine information (GSVI Vaksin) produces positive coefficients that are also statistically significant to the rate of return, it shows that the existence of this vaccine is said to reduce the feeling of fear felt by the public and be a turning point in performance improvements in the stock market. So that more and more people who care about information related to the COVID-19 Vaccine cause people's views will be more optimistic about the stock market so that it can then cause the stock market to return to normal. This confirms that the Covid-19 vaccine information give positive effect on stock Return in accordance with the second hypothesis formed. This is consistent and reinforces the statement in the study conducted by (Hong et al., 2021) which states that the arrival of vaccines will cause a shift in stock prices to pre-pandemic levels which of course in line with the resulting *return* rate that will improve.

The results of the first and second regressions in Table 2, reinforced also by the results shown by the third regression where in this third regression the two variables included separately in the previous processing are now entered simultaneously and accompanied by other intercept variables, which also show that the COVID-19 (GSVI Covid) information is correctly negatively affecting the return rate of shares and while the Vaccine information (GSVI Vaccine) Positively, this is in line with the 2 results in the first and second regressions before.

Table 2 – Regression for Daily Return dependent variables

| Variables | (1) | (2) | (3) |
|------------|---------------------|-----------------------|-----------------------|
| | - | | - |
| GsviCovid | 0,00002 (0,000)* | | 0,0000042 (0,036)* |
| GsviVaksin | | 0,0003956 (0,000)* | 0,0000861 (0,000)* |

| | | | |
|--------------|---------------------|----------------------|---------------------------|
| MarketReturn | | | 0,4467158 (0,000) |
| Momentum | | | - 0,0062229 (0,000) |
| MarketCap | | | 0,0113047 (0,000) |
| BMRatio | | | - 0,0023935 (0,000) |
| Constant | 0,000233 (0,102) | 0,0004662 (0,000) | - 0,0316585 (0,000) |
| R-Squared | 0,00200 | 0,00300 | 0,02230 |
| F-Value | 0,00480 | 0,00470 | 0,00000 |

Note : * Indicates $p < 0.05$

4.2.2. Effect of Covid-19 Outbreak and Vaccine Information on Volatility

In addition to its effect on return rates, Table 3 shows the results of estimates of each variable independent of market volatility to show how the influence given by these variables, especially the GSVI indices, shows market volatility. From the table, the results of the first regression show that the search volume related to the information of the COVID-19 outbreak (GSVI Covid) has a positive and statistically significant effect which shows that the rise of searches related COVID-19 indicates that the community is in a state of anxiety that causes a lot of activity that is it happens in the stock market, so the volatility will increase. This is in accordance with the third hypothesis built in this study where the transformation related to COVID-19 outbreak has positive impact on Volatility. This suggests that the pandemic affected investor sentiment and caused excessive volatility in the market. These results are consistent with the previous literature that claim investor sentiment may explain volatility in stock market (Da et al., 2015).

Table 3 – Regression for Volatility dependent variables

| Variables | (1) | (2) | (3) |
|--------------|----------------------|---------------------------|----------------------------|
| GsviCovid | 0,000268 (0,000)* | | 0,0000226 (0,000)* |
| GsviVaksin | | - 0,000176 (0,042)* | - 0,0001044 (0,000)* |
| MarketReturn | | | 0,0152433 (0,000) |
| Momentum | | | 0,0212278 (0,000) |

| | | | |
|-----------|----------------------|----------------------|---------------------------|
| MarketCap | | | 0,0072022 (0,000) |
| BMRatio | | | - 0,0019933 (0,000) |
| Constant | 0,0196668 (0,000) | 0,0197567 (0,000) | 0,0012254 (0,265) |
| R-Squared | 0,00300 | 0,00190 | 0,01820 |
| F-Value | 0,00000 | 0,00000 | 0,0000 |

Note : * Indicates $p < 0,05$

As for the influence of Vaccine information (GSVI Vaksin) on volatility, it can be seen in Table 3 on the second regression where the coefficient is negative and statistically significant. This shows that with a lot of information related to the COVID-19 Vaccine, it reduces the fear and anxiety of the public which can ultimately make people more optimistic and more careful in trading stocks, which ultimately lowers stock market volatility. So this supports the fourth hypothesis built in this study where information related to the COVID-19 outbreak give negative impact to stock volatility.

In addition, the results shown by the third regression in Table 3 show conclusions that are in line with the previous 2 regression results, which means that with the or absence of other Intercept variables, information on the COVID-19 outbreak (GSVI Covid) remains positively influential on volatility in the stock market, while for Vaccine information (GSVI Vaksin). Show a negative influence. This, of course, reinforces the results that have been interpreted before.

4.2.3. The Impact of Covid-19 Outbreak and Vaccine Information on Every Industry

To strengthen the regression results that have been shown before, this study also tried to investigate how the influence of outbreak information and the COVID-19 vaccine both on return levels and volatility in detail for each industry group. Here regression is done by including both the GSVI index along with other intercepts and the results are shown in Table 4 and Table 5.

Table 4 shows how each variable affects the return rate for each existing industry. In the table is shown results that are in line with previous findings, where information related to the COVID-19 virus outbreak is also seen to create negative sentiment for the majority of industry groups and cause a decrease in the return rate in the stock market, although it is seen that some industries that are not so affected such as the Financials, Health Care, IT, and Materials Industries. In addition, the emergence of information related to COVID-19 vaccine also makes the pressure on the stock market look less and less so that it has a positive influence on the rate of Return, which is consistent with the findings of previous analysis by (Acharya et al., 2020) which mentions that the rate of spread of vaccines can help improve the rate of Return in stock market.

Next, the effect of each variable on market volatility for each Industry the results are shown in Table 5. It pointed out that in addition to the Financial, Industrials, and IT groups, the majority of Industries supported the finding that sentiment generated by COVID-19 information caused excessive volatility in stock market, in line with the statement by (Joseph et al., 2011) that the amount of disbursement of information online can lead to the movement of transaction volume in the stock market. And conversely, the information of the COVID-19 Vaccine has a negative influence which with the presence of vaccines, the market will become more stable and volatility will decrease.

Table 4 – Regression of each industry to Daily Return dependent variables

| | Consumer Staples | Energy | Finance | Health Care | Industrials | IT | Materials | Real Estate | Utilities |
|--|---------------------|------------------------|--------------------|--------------------|---------------------|--------------------|--------------------|---------------------|---------------------|
| | -0,0001 (0,038)* | 0,0005 (0,003) * | 0,0003 (0,806) | 0,0001 (0,000)* | -0,0002 (0,046)* | 0,0009 (0,759) | 0,0008 (0,575) | -0,0004 (0,006)* | -0,0003 (0,042)* |
| | 0,0002 (0,042)* | 0,0004 (0,008) * | 0,0002 (0,070) | 0,0004 (0,875) | 0,0003 (0,002)* | 0,0003 (0,361) | 0,0002 (0,150) | 0,0001 (0,031)* | 0,0002 (0,006)* |
| | 0,4941 (0,000) | 0,5137 (0,000) | 0,4521 (0,000) | -0,0001 (0,645) | 0,4057 (0,000) | 0,4378 (0,000) | 0,5876 (0,000) | 0,3466 (0,000) | 0,6202 (0,000) |
| | -0,0219 (0,000) | 0,0038 (0,207) | 0,0121 (0,000) | 0,6471 (0,000) | -0,0002 (0,919) | 0,0471 (0,000) | -0,0158 (0,000) | 0,0002 (0,938) | -0,0043 (0,629) |
| | 0,0003 (0,158) | 0,0091 (0,007) | 0,0003 (0,149) | 0,0003 (0,954) | 0,0008 (0,001) | 0,0012 (0,129) | 0,0006 (0,010) | 0,0005 (0,085) | -0,0004 (0,629) |
| | -0,0002 (0,464) | 0,0001 (0,653) | -0,0009 (0,000) | -0,0018 (0,029) | -0,0002 (0,449) | -0,0031 (0,009) | -0,0009 (0,003) | 0,0002 (0,916) | -0,0018 (0,161) |
| | 0,0001 (0,874) | 0,0005 (0,967) | 0,0003 (0,741) | -0,0041 (0,000) | -0,0015 (0,106) | 0,0001 (0,969) | 0,0002 (0,818) | -0,0007 (0,538) | 0,0052 (0,216) |
| | 0,0489 | 0,0474 | 0,0313 | 0,0664 | 0,0255 | 0,0450 | 0,0549 | 0,0228 | 0,0663 |
| | 0,0000 | 0,0000 | 0,0000 | 0,0000 | 0,0000 | 0,0000 | 0,0000 | 0,0000 | 0,0000 |

| Variable | Consumer Discretionary | Constant | R-Squared | F-Value |
|----------------|------------------------|--------------------|-----------|---------|
| Gsvi Covid | 0,0004 (0,045)* | 0,0293 (0,000) | 0,0207 | 0,0000 |
| Gsvi Vaks in | -0,0003 (0,096) | 0,02560 (0,000) | 0,0207 | 0,0000 |
| Mark etRe turn | 0,0198 (0,026) | 0,0034 (0,000) | 0,0207 | 0,0000 |
| Mome ntum | 0,02560 (0,000) | 0,0007 (0,000) | 0,0207 | 0,0000 |
| Mark etCap | -0,0034 (0,000) | 0,0293 (0,000) | 0,0207 | 0,0000 |
| BMRA tio | -0,0007 (0,000) | 0,0293 (0,000) | 0,0207 | 0,0000 |
| Cons tant | 0,0293 (0,000) | 0,0293 (0,000) | 0,0207 | 0,0000 |
| R-Squa red | 0,0207 | 0,0207 | 0,0207 | 0,0000 |
| F-Valu e | 0,0000 | 0,0000 | 0,0000 | 0,0000 |

Note : * Indicates $p < 0,05$

CONCLUSION

The study was conducted with the aim of reviewing whether sentiment generated from information related to the COVID-19 outbreak and vaccine would be able to influence stock market behavior in terms of market Return and Volatility. Google keywords "Covid + coronavirus + covid-19 + delta" and "vaccine + stage 1 / stage 2 + dose 1 / dose 2 + az seneca + pfiser + sinovac + sinopharm + moderna" are indexes of search volume used as proxies in measuring investor attention to outbreak-related information and the COVID vaccine- 19. The first analysis was to look at how the relationship between the volume of search for outbreak information and the COVID-19 vaccine to the return rate of the stock market in Indonesia. In the results of the study it was seen that attention to the COVID-19 virus outbreak generally creates negative sentiment for market participants, which is said to have put pressure on the stock market, causing a decrease in the existing return rate. In addition, the inverse relationship is shown between the volume of COVID-19 vaccine information search and return where with the information related to vaccines, it makes the pressure on the stock market decrease and market performance gradually improves.

Furthermore, the study also tried to explain the relationship between search volume whether it was related to outbreak information or COVID-19 vaccine information to stock market volatility. It is said that the sentiment generated by the outbreak information creates excessive volatility in the market. These results, are consistent with the literature that investor sentiment can explain market volatility. This is contrary to the sentiment generated by vaccine information where with the vaccine it reduces the fear and anxiety of the public which can then eventually make people become more optimistic and more careful in trading stocks, and ultimately reduce stock market volatility.

Google's use of trend-based sentiment indexes is widely accepted and used in empirical literature, but it's still not without its limitations. One of the main limitations of using this index is the difficulty in distinguishing between positive and negative emotions. The keywords associated with the occurrence of COVID 19 used as the Google search index in this study suggest that the resulting search volume index represents negative emotions generated as a result of an increased pandemic. It may be, but it doesn't really represent all parties because it's still certain, the parties who are actually benefiting from this pandemic and vaccine related keywords. COVID 19. Therefore, it is said that it is important to properly distinguish between positive and negative emotions. In addition, Google Trends also provides an overall normalized search volume. This narrows the scope of the study and allows us to investigate the impact

of different pandemics on investors in different demographic categories. This topic may be covered in future research where more diverse information on investor sentiment will be available.

REFERENCE

- Acharya, V. V., Johnson, T. C., Sundaresan, S. M., & Zheng, S. (2020). The Value of a Cure: An Asset Pricing Perspective. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.3731098>
- Alfani, G., & Murphy, T. E. (2017). Plague and Lethal Epidemics in the Pre-Industrial World. *Journal of Economic History*, 77(1), 314–343. <https://doi.org/10.1017/S0022050717000092>
- Antweiler, W., & Frank, M. Z. (2004). Is All That Talk Just Noise? The Information Content of Internet Stock Message Boards. *The Journal of Finance*, 59(3), 1259–1294. <https://doi.org/10.1111/J.1540-6261.2004.00662.X>
- Baker, M., & Wurgler, J. (2007). Investor sentiment in the stock market. *Journal of Economic Perspectives*, 21(2), 129–151. <https://doi.org/10.1257/jep.21.2.129>
- Bank, M., Larch, M., & Peter, G. (2011). Google search volume and its influence on liquidity and returns of German stocks. *Financial Markets and Portfolio Management 2011 25:3*, 25(3), 239–264. <https://doi.org/10.1007/S11408-011-0165-Y>
- BKPM. (2020). *Pengaruh Covid-19 terhadap Investasi di Indonesia | Invest Indonesia*. <https://www.investindonesia.go.id/id/artikel-investasi/detail/pengaruh-covid-19-terhadap-investasi-di-indonesia>
- Carhart, M. M. (1997). On Persistence in Mutual Fund Performance. *JOURNAL OF FINANCE*.
- Chundakkadan, R., & Nedumparambil, E. (2021). In search of COVID-19 and stock market behavior. *Global Finance Journal*, xxxx, 100639. <https://doi.org/10.1016/j.gfj.2021.100639>
- Cucinotta, D., & Vanelli, M. (2020). WHO declares COVID-19 a pandemic. *Acta Biomedica*, 91(1), 157–160. <https://doi.org/10.23750/abm.v91i1.9397>
- Da, Z., Engelberg, Joseph, & Gao, P. (2011). In Search of Attention. *Journal of Finance*, 66(5), 1461–1499.
- Da, Z., Engelberg, J., & Gao, P. (2015). The sum of all FEARS investor sentiment and asset prices. *Review of Financial Studies*, 28(1), 1–32. <https://doi.org/10.1093/rfs/hhu072>
- De La Fuente, A., Jacoby, H. G., & Lawin, K. G. (2019). Impact of the West African Ebola Epidemic on Agricultural Production and Rural Welfare: Evidence from Liberia. *Journal of African Economies*, 29(5), 454–474. <https://doi.org/10.1093/jae/ejaa002>
- Fama, E. F., & French, K. R. (1993). Common risk factors in the returns on stocks and bonds. *University*

Of Chicago.

- Fama, E. F., & Malkiel, B. G. (1970). Efficient Capital Markets: A Review of Theory and Empirical Work. *The Journal of Finance*, 25, 383–417.
- Garman, M. B., & Klass, M. J. (1980). On the Estimation of Security Price Volatilities from Historical Data. *The Journal of Business*, 53, 67–68.
- Grab, J., Kellers, M., & Le Mezo, H. (2021). *Rotation towards normality – the impact of COVID-19 vaccine-related news on global financial markets*. ECB Economic Bulletin. https://www.ecb.europa.eu/pub/economicbulletin/focus/2021/html/ecb.ebbox202101_02~f0960a5b38.en.html
- Heyman, D., Lescrauwaet, M., & Stieperaere, H. (2019). Investor attention and short-term return reversals. *Finance Research Letters*, 29, 1–6. <https://doi.org/10.1016/J.FRL.2019.03.003>
- Hirshleifer, D., Jiang, D., & DiGiovanni, Y. M. (2020). Mood beta and seasonalities in stock returns. *Journal of Financial Economics*, 137(1), 272–295. <https://doi.org/10.1016/J.JFINECO.2020.02.003>
- Hong, H., Wang, N., & Yang, J. (2021). Implications of Stochastic Transmission Rates for Managing Pandemic Risks. *Review of Financial Studies*.
- Joseph, K., Babajide Wintoki, M., & Zhang, Z. (2011). Forecasting abnormal stock returns and trading volume using investor sentiment: Evidence from online search. *International Journal of Forecasting*, 27(4), 1116–1127. <https://doi.org/10.1016/J.IJFORECAST.2010.11.001>
- Kaplanski, G., & Levy, H. (2010). Sentiment and stock prices: The case of aviation disasters. *Journal of Financial Economics*, 95(2), 174–201. <https://doi.org/10.1016/J.JFINECO.2009.10.002>
- Karamoy, H., & Tulung, J. E. (2020). The Effect of Financial Performance and Corporate Governance To Stock Price In Non-Bank Financial Industry. *Corporate Ownership & Control*, 17(2), 97-103.
- Kentikelenis, A., King, L., McKee, M., & Stuckler, D. (2015). The International Monetary Fund and the Ebola outbreak. *The Lancet Global Health*, 3(2), e69–e70. [https://doi.org/10.1016/S2214-109X\(14\)70377-8](https://doi.org/10.1016/S2214-109X(14)70377-8)
- Kim, N., Lučivjanská, K., Molnár, P., & Villa, R. (2019). Google searches and stock market activity: Evidence from Norway. *Finance Research Letters*, 28, 208–220. <https://doi.org/10.1016/J.FRL.2018.05.003>
- Latoeiro, P., Ramos, S. B., & Veiga, H. (2013). Predictability of stock market activity using Google search queries. *Statistics and Econometrics*.
- Long, J. B. De, Shleifer, A., Summers, L., & Waldmann, R. (1990). Noise Trader Risk in Financial Markets. *Journal of Political Economy*.
- Putra. (2020). *Pengusaha Sebut Vaksinasi Covid-19 Menjadi Investasi Bagi Industri*. <https://www.cnbcindonesia.com/market/20201203055204-17-206465/vaksin-darurat-sudah-tiba->

tapi-investor-jangan-kalap-ya/3

- Rouatbi, W., Demir, E., Kizys, R., & Zaremba, A. (2021). Immunizing markets against the pandemic: COVID-19 vaccinations and stock volatility around the world. *International Review of Financial Analysis*, 77(April), 101819. <https://doi.org/10.1016/j.irfa.2021.101819>
- Stambaugh, R. F., Yu, J., & Yuan, Y. (2012). The short of it: Investor sentiment and anomalies. *Journal of Financial Economics*, 104(2), 288–302. <https://doi.org/10.1016/J.JFINECO.2011.12.001>
- Sugianto, D. (2020). *Perjalanan IHSG Sejak RI Positif Virus Corona*. <https://finance.detik.com/bursa-dan-valas/d-4972595/perjalanan-ihsg-sejak-ri-positif-virus-corona>
- Tetlock, P. C. (2007). Giving Content to Investor Sentiment: The Role of Media in the Stock Market. *The Journal of Finance*, 62(3), 1139–1168. <https://doi.org/10.1111/J.1540-6261.2007.01232.X>
- Vlastakis, N., & Markellos, R. N. (2012). Information demand and stock market volatility. *Journal of Banking & Finance*, 36(6), 1808–1821. <https://doi.org/10.1016/J.JBANKFIN.2012.02.007>
- Zandi, M., DeRitis, C., Sweet, R., Cochrane, S., Ell, K., & Xu, X. (2020). Coronavirus: The Global Economic Threat. *Moody's Analytics*.
- Zhang, D., Hu, M., & Ji, Q. (2020). Financial markets under the global pandemic of COVID-19. *Finance Research Letters*, 36, 101528. <https://doi.org/10.1016/J.FRL.2020.101528>