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Pandemic and Indonesia Stock Market Performance

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ABSTRACT: This study aims to analyze the impact of the COVID-19 pandemic on Indonesia's stock market performance. Considering the characteristics of daily stock return data that shows the characteristics of volatility clustering, the analytical method used is to develop a heteroscedastic model specification whose parameters are estimated using the maximum likelihood method. Based on data from March 2020 to January 2021, this study finds that the Exponential-GARCH asymmetric model is the best model compared to the Standard-GARCH symmetric model or the asymmetric Threshold-GARCH model. The inference analysis conducted on the Exponential-GARCH asymmetric model in this study shows that the stock market's performance that is significantly affected by this pandemic is the volatility of its returns. Stock price volatility is one of the important variables in stock market performance. This study produces empirical findings that government policies on social restrictions contribute significantly to suppressing stock market volatility. As for government policies in mitigating the risk of the spread of the epidemic, in this study it is measured through a stringency index. This index was released by the Oxford COVID-19 Government Response Tracker (OxCGRT) which monitors the government's response to the coronavirus in 160 countries and is a parameter that evaluates the policies taken by a country's government based on nine metrics. This index does not measure the effectiveness of a country's government response, but only the level of tightness. However, the results of the tests carried out in this study did not find a significant impact of pandemic indicators, the number of cases, and the number of daily deaths related to COVID-19 on stock returns.
Keywords: Pandemic, Stringency Index, EGARCH, Return Volatility

INTRODUCTION

The movement of the stock index in a country is often used as a benchmark to see the country's economic condition at a macro level. The stock index of a country that is experiencing a decline can be caused by economic conditions in that country that are experiencing problems. On the other hand, an increase in the stock price index may indicate an improvement in economic performance in the country. Pandemic, a term that often appears in the past more than a year,

is estimated to be one of the factors that affect the performance of the stock market (Bai et al., 2021; Sreeramula & Rahardjo, 2021; Tosepu et al., 2020).

If we look at history in 1918, the Spanish flu which spread widely to all corners of the world amid the outbreak of world war was the deadliest pandemic in the 20th century. The pandemic caused by the Type A influenza virus subtype H1N1 killed 40 to 50 million people in a two-year period, between 1918 and 1920. This pandemic resulted in a higher death rate than the victims of the first world war (Billings, 1997). The Spanish flu pandemic resulted in a short-term recession from August 1918 to March 1919, as shown in the movement of the Dow Jones index which can be seen in Figure 1.

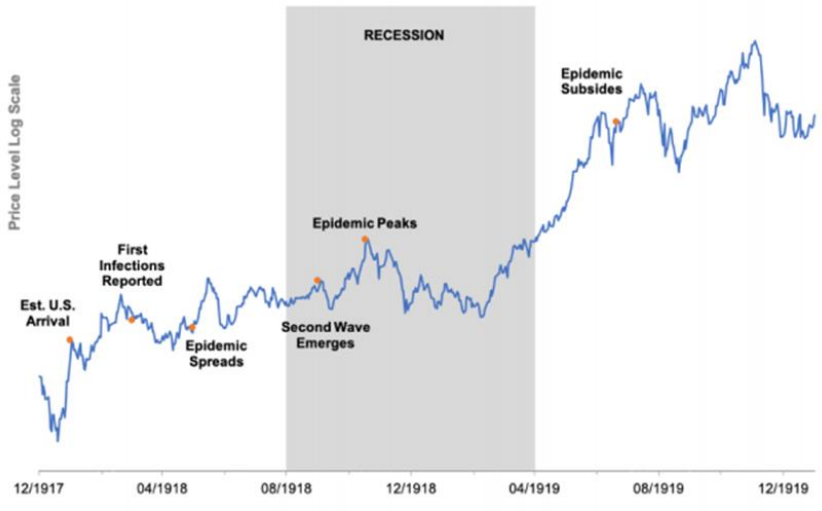

Figure 1. Movement of the Dow Jones Stock Index during the Spanish Flu Pandemic (Source: Wall Street Journal, 2020)

The Spanish flu pandemic had a short-term impact on the economy. One of the important factors that took into consideration the conclusion was the impact of the world war that occurred at that time. The United States government gave a mandate for manufacturers to continue to produce to meet the needs of the war. This decision caused the pandemic condition to get worse but minimized negative economic shocks as well as employment. The limitation of communication is one of the factors causing it the minimal exposure of the Spanish flu pandemic to the economy. At that time, the most common forms of communication were letters and newspapers. Thus, it is difficult to implement social restrictions, so that people's daily activities can continue as usual (Garrett, 2008).

Subsequent pandemics along with the movement of the Dow Jones index are shown in Figure 2, the Asian flu began in East Asia in 1957. After Singapore, the virus spread to the country of Hong Kong and then to the coastal cities of the United States in the summer of 1957. The third flu pandemic, flu Hong Kong, was first detected in China in June 1968. The last two pandemics of the 2nd century left a trail of deaths of around four million people worldwide. However, the impact of the pandemic on the economy cannot be said to be static over time. From July 13th, 1968, until the end of 1969, the Dow Jones index had fallen by 13.24 percent and at its lowest point during the pandemic, the Dow Jones index had fallen by 21 percent.

The 2009 to 2010 flu pandemic, known as swine flu or swine flu, was first reported on March 17th, 2009, in Mexico. At that time, the United States was still not free from the effects of the 2008 global financial crisis and the majority of stock prices were still below the market. Since the beginning of the pandemic until the end of the outbreak, the Dow Jones index has reportedly

experienced a decline of more than 40 percent. Thus, the authors conclude that each flu pandemic has various impacts on the economy. This is influenced by several factors, such as the severity of the outbreak, the government's handling of it, and the structure of the country's economy (WHO, 2008).

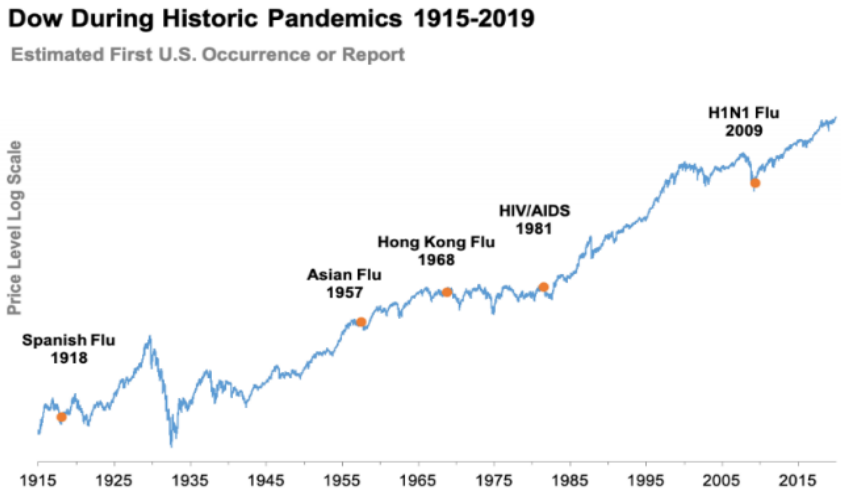

Figure 2. Movement of the Dow Jones Index 1915 – 2019
(Source: Macro Trends & Centers for Disease Control and Prevention, 2020)

Another pandemic that occurred in the 21st century and is still happening at the time of this research is COVID-19. COVID-19 started as an epidemic in China before spreading around the world in a matter of months. WHO officially declared the COVID-19 virus as a pandemic on March 11th, 2020? The rapid spread of the COVID-19 outbreak in Indonesia has had a major impact on the Indonesian economy. The surge in the number of sufferers with a high fatality rate is very worrying and causes panic among the government, society, and the business world. The response of the government and the community to take preventive measures such as school closures, work from home for formal sector workers, delays and cancellations of various government and private events, termination of several modes of public transportation, implementation of social restrictions in various regions, and prohibitions on going home made the wheels of the economy slow down (Brodeur et al., 2021; Padovani & Iacuzzi, 2021).

Panic due to COVID-19 also hit the Indonesian financial market, with indications that during the period of the spread of COVID-19 from January to April 2020, there was a capital outflow which amounted to 159.3 trillion Rupiah. The movement of capital outflows from foreign investors always causes high volatility both in exchange rate movements and stock index movements during a crisis (Haryanto, 2020). After the WHO officially declared COVID-19 a pandemic, the JCI (Jakarta Composite Index) fell as much as 4.2 percent to 4,937 on March 12th, 2020, its lowest level in nearly four years. On March 13th, 2020, the Indonesia Stock Exchange (IDX) suspended JCI trading on the trading system for the first time since 2008 due to the impact of the COVID-19 pandemic.

Seeing the changing economic structure, economic slowdown, and the global spread of the COVID-19 virus which has reached more than 80 million cases and 1.6 million deaths as of December 2020, the author is interested in conducting research related to the impact of the COVID-19 pandemic on the Indonesian economy. In this study, the authors use the variable rate of return and return volatility of JCI as indicators of economic conditions. The stock index reflects various kinds of information that is happening in the market in complex situations and is the right variable to assess the economic response to the pandemic (Wagner, 2020). The

existence of volatility will cause the risk and uncertainty faced by investors to invest to become unstable. A volatile market will make it difficult for companies to raise their capital in the capital market because it has higher uncertainty than the rate of return obtained (Kartika, 2010). Moreover, stock market return volatility analysis is also important for policy makers to adjust their response to control the volatility (Gentilini & Orton, 2021).

The focus of this research is the impact of the COVID-19 pandemic on stock market performance using a time sample of March 2020 to January 2021. In assessing the impact of COVID-19, the authors use three daily time series variables, namely the number of new cases, the number of deaths, and government policies. The significantly adverse impact of growth in the total of confirmed cases and death due to COVID-19 on Indonesia's daily stock returns. Moreover, the lockdown policies regardless how strict they are, have a positive and significant impact on the Indonesia's daily stock returns. Considers the different impact of COVID-19 pandemic on each of eight observed sectors; where the sector of property as well as trade, service and investment have a significantly negative performance; while the sector of basic industry, consumer goods and mining have a significantly better performance (Utomo & Hanggraeni, 2021).

The author uses a stringency index to measure the response or level of strictness of government regulations. The policies implemented by the government with the aim of controlling and minimizing the spread of the virus are expected to reduce the negative impact of the pandemic on the economy. But over time, these policies have had the opposite effect. For example, the lockdown is considered effective in controlling the spread of the virus, causing a drastic increase in unemployment, especially in the service industry. In April 2020, the United States' unemployment rate reached 14.7 percent, the highest for the last seventy years (Ashraf, 2020). The COVID-19 pandemic had a greater negative impact on the United States economy when compared to the 2009 recession (Stebbins, 2020). COVID-19 had a significant effect on the standard deviation of returns stock (Yousef, 2020). The government policies in mitigating the risk of the spread of COVID-19 led to a significant decrease in stock market volatility (Baig et al., 2020; Ibrahim et al., 2020).

In uncertainty regarding when the pandemic will end, it is important to examine how the impact of the government's mitigation response on stock market performance is one of the important indicators of the country's economic condition.

METHOD

Analysis of the impact of the COVID-19 pandemic in this study will be carried out by applying the asymmetric GARCH approach. This is because many studies show that stock return volatility responds with different magnitudes to bad news and good news entering the market. Regarding the impact of the COVID-19 pandemic, the predictors of return and stock return volatility that will be used in this study are the number of daily COVID-19 cases, the number of daily deaths related to COVID-19, and government policies as proxied by the stringency index.

The Oxford COVID-19 Government Response Tracker (OxCGRT) monitors government responses to the coronavirus in 160 countries and releases an index called the stringency index. This index is a parameter that evaluates the policies taken by the government of a country based on nine metrics, namely school closures, workplace closures, cancellations of public events, bans on gatherings, closures of public transportation, obligations to stay at home, public campaigns, social restrictions, and travel ban. The higher the stringency index value, the stricter the policies imposed by the local government regarding policies during the COVID-19 pandemic. The minimum value of this index is 0 and the maximum is 100. Based on the description, this index does not measure the effectiveness of a country's government response, but only the level of

strictness. A high stringency index value does not mean a country has responded to the COVID-19 pandemic better than other countries.

The data used in this study are JCI return data, the number of COVID-19 cases, the COVID-19 death rate, and the stringency index, each of which is a time series data in daily data frequency during the period March 2020 to January 2021. The data and information in This research were taken through the internet sourced from the following sites:

Table 1. Variables and Research Data Sources

Symbol	Description	Source
IHSG	JCI (Jakarta Composite Index)	Yahoo Finance (https://finance.yahoo.com/)
CASES	Daily number of confirmed COVID-19 cases	Our World in Data (https://ourworldindata.org/)
DEATH	Daily number of confirmed COVID-19 deaths	Our World in Data (https://ourworldindata.org/)
STRINGCY	Stringency Index	University of Oxford Research (https://covidtracker.bsg.ox.ac.uk/)

As the study of the impact of this pandemic was carried out by applying the asymmetric GARCH approach, therefore, the first step is to look at the movement of the stock price index return through a time series plot and its descriptive statistics. Exploration of these data can show the characteristics of JCI returns as well as explain the existence of heteroscedasticity symptoms. To that end, a series of diagnostic tests will be carried out. If the test results show volatility clustering in the stock return data, the GARCH modeling will be applied. The criteria that will be used to determine the best GARCH variant are statistical errors which include AIC, SIC, and HQ statistics (Ibrahim et al., 2020).

In addition to the Standard-GARCH model, the asymmetric GARCH models that will be evaluated in this study are the Exponential-GARCH and Threshold-GARCH models with the following specifications.

Exponential-GARCH:

$$y_t = \mu + \gamma_1 cases + \gamma_2 death + \gamma_3 stringcy + \varepsilon_t \quad (1)$$

$$\ln(\sigma_t^2) = \omega + \beta \ln(\sigma_{t-1}^2) + \gamma \frac{u_{t-1}}{\sqrt{\sigma_{t-1}^2}} + \alpha \left[\frac{|u_{t-1}|}{\sqrt{\sigma_{t-1}^2}} - \sqrt{\frac{2}{\pi}} \right] + \delta_1 cases + \delta_2 death + \delta_3 stringcy \quad (2)$$

Threshold-GARCH:

$$y_t = \mu + \gamma_1 cases + \gamma_2 death + \gamma_3 stringcy + \varepsilon \quad (3)$$

$$\sigma_t^2 = \omega + \alpha_1 u_{t-1}^2 + \beta \sigma_{t-1}^2 + \gamma u_{t-1}^2 I_{t-1} + \delta_1 cases + \delta_2 death + \delta_3 stringcy \quad (4)$$

The impact of the COVID-19 pandemic on financial market performance (JCI returns) is measured by the parameters γ_1, γ_2 and γ_3 in equations (1) and (3) in the mean equation, while its impact on stock return volatility is measured by parameters δ_1, δ_2, and δ_3 in the variance equation equations (2) and (4) above.

RESULTS AND DISCUSSION

JCI data (5 days a week, starting from March 3, 2020 to January 23, 2021) used in this study is expressed in the natural logarithm of the ratio of two consecutive JCI data to obtain a return. Figure 3 shows the movement of stock returns during the period. Figure 3 below shows that the JCI's rate of return experienced shocks at the beginning of the period which caused quite high

volatility in stock returns. This is because in the March 2020 period, Indonesia has just officially started reporting the first COVID-19 case, as well as the WHO which inaugurated COVID-19 as a pandemic in mid-March 2020. The phenomenon of volatility clustering also seems to emerge from visual observations in the graph above. This is reinforced by the results of the diagnostic test shown in Table 2 which shows that there is sufficient statistical evidence to state that there is significant volatility clustering in the JCI return data.

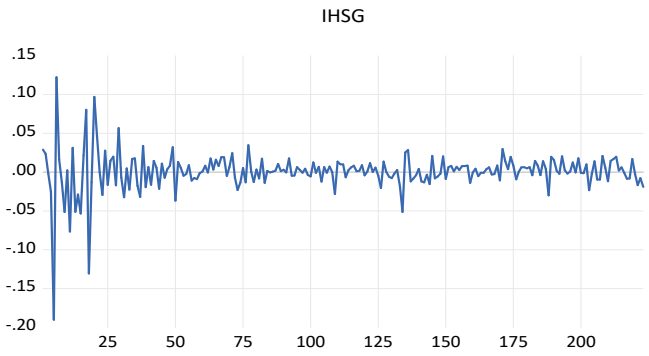

Figure 3. JCI Return Movements Period M3.2020 – M1.2021

Table 2. Testing the Heteroskedasticity Return of JCI

Heteroskedasticity Test: ARCH

F-statistic	13.46513	Prob. F(2,208)	0.0000
Obs*R-squared	24.18712	Prob. Chi-Square(2)	0.0000

Jarque-Bera probability in the following graph (Figure 4) and table also provides statistical evidence that JCI returns are not normally distributed with a distribution characterized by fat-tails.

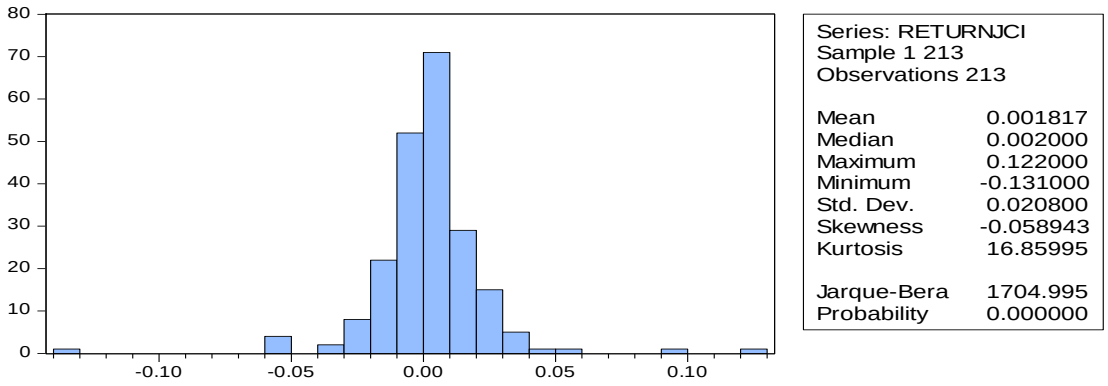

Figure 4. Results of the JCI Return Normality Test

The simplest GARCH model (standard-GARCH), commonly called the generic model or plain vanilla GARCH model and the estimation results of the asymmetric model are shown in Table 3 below. AIC, Schwarz, and Hannan-Quinn statistics show that the specification of the EGARCH model is the model that produces the smallest error compared to the Standard-GARCH model and the asymmetric Threshold-GARCH model. Based on the EGARCH estimation results shown in Table 3, it appears that at the 5% alpha significance level, the number of daily cases,

the number of daily deaths due to COVID-19 partially have no significant impact on return movements and stock return volatility.

Table 3. Estimation Results of GARCH Models

	Standard-GARCH	Exponential-GARCH	Threshold-GARCH
Mean Equation			
μ	0.016407 (0.960342)	0.007601 (0.3369)	0.016407 (0.6564)
γ_1	1.09E-06 (0.8706)	9.94E-07 (0.2609)	1.09E-06 (0.8714)
γ_2	-5.70E-05 (0.8480)	-5.75E-05 (0.1672)	-5.70E-05 (0.8494)
γ_3	-0.000210 (0.7334)	-6.59E-05 (0.5654)	-0.000210 (0.7403)
Variance Equation			
ω	0.000385 (0.5897)	-0.316342 (0.0607)	0.000385 (0.5758)
β	0.600000 (0.3245)	0.933408*** (0.0000)	0.600000 (0.3168)
γ		-0.098518 (0.1819)	0.050000 (0.9262)
α	0.150000 (0.5070)	0.185462*** (0.0434)	
α_1			0.150000 (0.6543)
δ_1	0.000000 (1.0000)	6.61E-06 (0.8552)	0.000000 (1.0000)
δ_2	0.000000 (1.0000)	-0.000265 (0.8705)	0.000000 (1.0000)
δ_3	0.000000 (1.0000)	-0.006587*** (0.0259)	0.000000 (1.0000)
Hannan-Quinn	**-4.526635**	**-5.542877**	**-4.505924**
AIC	**-4.596788**	**-5.619407**	**-4.582454**
Schwarz Criterion	**-4.423200**	**-5.430038**	**-4.393086**

Significance level 5%

However, the variance equation in the EGARCH model shows that the government's role in implementing new policies related to mitigating the spread of the COVID-19 outbreak has played a role in reducing volatility in the stock market. This is indicated by the estimated Stringency Index (δ_3) parameter which is negative and significant. The higher the Stringency Index or the stricter the government in mitigating risk, the lower the volatility that occurs in the stock market. At this point, the government's policies in mitigating the risk of the virus spreading have reduced the negative impact of the pandemic on the economy. One indicator of stock market performance is controlled asset price volatility. The results of this study further strengthen and add empirical evidence to the results of previous empirical studies, that government policies in social restrictions contribute positively to reduce stock market volatility (Ashraf, 2020; Baig et al., 2020; Ibrahim et al., 2020).

CONCLUSION

Using data in the early March 2020 – January 2021 timeframe, the best model developed to analyze the effect of the COVID-19 pandemic on stock market performance is the asymmetric Exponential GARCH model. The test results show that the movement of stock returns is not significantly influenced by the pandemic indicators, the number of cases, the number of daily deaths, and government policies in mitigating them. A very important stock market performance, which is significantly affected by this pandemic is the volatility of its returns.

This study produces empirical findings that government policies on social restrictions contribute significantly to suppressing stock market volatility. An increasingly volatile market will lead to higher risks and uncertainties faced by investors in investing. The results of this study will be important information for portfolio managers in assessing the risks of investing in the Indonesian financial market during the COVID-19 pandemic, that investment risk is closely related to the policies implemented by the government in mitigating the risk of spreading the virus.

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