

Impact of COVID-19 and Macroeconomic Factors on Sharia Stock Market Performance: A Case Study of Indonesia

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Macroeconomic variables strongly influence investment decisions because macroeconomic variables can affect the stock market according to the country's economic conditions and government policies. The Covid-19 pandemic has harmed the economy of almost all countries in the world, including Indonesia. This study explores the effect of Covid-19 and various macroeconomic variables on Islamic stock prices in Indonesia, namely the Jakarta Islamic Index (JII), by analyzing monthly data from 2015 to 2020. This study uses the Vector Error Correction Model (VECM) to investigate the short-term and long-term effects of each macroeconomic variable and international stock index to the JII index. The results showed that the Covid-19 dummy variable significantly impacts the JII index in the short term. Meanwhile, inflation, exchange rates, money supply, the United States S&P 500 index, China's SSE index, and the Covid-19 dummy variable significantly affect the JII index in the long term. Long-term results show that inflation, exchange rates, the United States S&P 500 index, and the Covid-19 dummy variable harm the JII index. On the other hand, the money supply and China's SSE Index positively affect the JII index. This study confirms that Covid-19 can affect the decline in the Islamic stock index in Indonesia, at least the results of this study can be used as material for discussion and research on the economic impact of the Covid-19 pandemic by providing empirical evidence that the pandemic has a restrictive effect on the performance of the Islamic stock market in Indonesia.

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INTRODUCTION

It has been a year since the COVID-19 pandemic was present, infecting almost the entire world. The COVID-19 pandemic began with an outbreak in Wuhan in December 2019 and has since turned into a pandemic that has infected more than 9 million people worldwide (WHO, 2020). The virus spread all over the world and devastated businesses and financial sectors. Consequently, the financial industry was severely hit due to a massive decline in the movement of capital, assets, and liquidity. A pandemic is a rare but recurring phenomenon. From 2002 to 2003, the world faced an outbreak of SARS, which began in early 2002, with the peak of deaths and cases coming in 2003. However, only a few countries felt the disaster due to SARS, namely China, Taiwan, and Hong Kong.

Contrary to the SARS epidemic, the COVID-19 virus has spread more rapidly due to economic integration and greater mobility through international networks that have been interwoven for decades by the process of globalization. As countries connect, the risk of COVID-19 transmission and its subsequent economic impact is expected to increase, and the increased risk can potentially disrupt capital flows and trade in goods and services. The COVID-19 outbreak has been accompanied by increasing instability in political and socio-economic conditions worldwide. This has forced investors in the capital market industry to seek stable portfolio platforms. Stability regardless of the financial and economic crisis caused by COVID-19 is observed among investment portfolios isolated from news and events occurring in a single country.

The financial crises that hit the world in 1997 and 2008 have been considered a setback for the stock market. Still, the stock market can benefit long term because it can serve as an alternative portfolio for others, who are more vulnerable to crisis episodes (Price Water House Coopers, 2009). However, the COVID-19 pandemic is relatively different from other world events that have plagued stock markets for decades, such as the Great Depression in 1933, Black Monday in 1987, and the Global Financial Crisis in 2008. The pandemic has caused much more significant declines in the markets. Stocks, where the crisis caused by the pandemic has led to relatively sharper declines in the stock market and higher volatility in exchange rates and commodity prices. There has been recent research on the effect or reaction of COVID-19 on the stock market in one or several countries in the world, such as (Baek, Mohanty, & Glambosky, 2020; Bahrini & Filfilan, 2020; K. Khan et al., 2020; Szczygielski, Bwanya, Charteris, & Brzeszczyński, 2021; Yong & Laing, 2020; Yousfi, Ben Zaied, Ben Cheikh, Ben Lahouel, & Bouzgarrou, 2021). Some of these studies concluded that the stock market during the COVID-19 pandemic was strongly influenced by the increase in COVID-19 cases in each country. Media coverage related to COVID-19 also greatly affected the volatility of stock prices.

Macroeconomic conditions also influence the stock market in a country. Several studies have shown results that can offer the relationship between stock markets and macroeconomics (Adam & Tweneboah, 2011; Chang, Bhutto, Turi, Hashmi, & Gohar, 2020; Kalyanaraman & Tuwajri, 2014; J. Khan & Khan, 2018; Peiró, 2016). Changes that occur in macroeconomic factors such as inflation, interest rates, and currency exchange rates will be reacted by the capital market. These factors can potentially influence the formation of stock prices. Reflecting on past events, the stock price index in the capital market is very vulnerable to changes in macroeconomic conditions both from within and outside the country. According to Tandelilin (2010), fluctuations in the capital market will be related to changes in various macroeconomic variables. Our study focuses on the impact of the COVID-19 outbreak on the Islamic stock market in Indonesia. An important implication of this study is to provide special treatment for the COVID-19 pandemic and find out its significant impact on the performance of the Islamic stock market.

LITERATURE REVIEW

Previous studies have investigated the impact of different epidemics on stock performance in the 21st century. The study confirms that fluctuations in the stock market caused by investor concerns and pessimism about future earnings due to the epidemic have brought significant economic losses to the market (Anh & Gan, 2020). Nippani and Washer (2004) found the negative impact of the SARS outbreak on the Chinese and Vietnamese stock markets. Jiang et al. (2017) assessed the relationship between the outbreak of the H7N9 influenza virus and the performance of Chinese stocks. They found that the number of daily cases increased significantly and negatively impacted stock prices across the overall market index and related sectors, including traditional Chinese medicine, biological production, and the biomedical industry in China. The Ebola virus outbreak also significantly affected associated stocks in the US securities market (Ichev and Marinc, 2018).

With the COVID-19 pandemic, the negative impact of the disease outbreak on stock markets around the world has been documented in various studies. Al-Awadhi, Alsaiifi, Al-Awadhi, & Alhammadi (2020) show that the daily increase in confirmed cases and deaths due to COVID-19 adversely affects the stock returns of all companies in China. He, Liu, Wang, & Yu (2020) evaluated the results of COVID-19 on the stock markets of various countries and found the negative impact of the pandemic on stock returns. This study also showed the spread effect among Asian, European, and American countries of the pandemic. The severe effects of COVID-19 on the stock market have forced governments worldwide to impose bans and restrictions (such as a ban on short sales) to reduce the risk of a

market crash, reduce volatility, and protect market stability (Kodres, 2020).

Then, several previous studies have studies related to market integration, several related studies such as the study of Majid, Meera, Omar, & Aziz (2009), which explored market integration among five ASEAN emerging markets during the financial crisis before and after the 1997 financial crisis, Perera & Wickramanayake (2012) examined financial market integration in major South Asian financial markets such as Bangladesh, India, Pakistan, and Sri Lanka in the period 2002 to 2010. Then, Al Nasser & Hajilee (2016) examined stock market integration among five emerging market stock markets. Brazil, China, Mexico, Russia, and Turkey developed markets such as the US, UK, and Germany from January 2001 to December 2014.

The stock market is strongly related to macroeconomic conditions in each country; as revealed by Adam & Tweneboah (2011), there is cointegration between macroeconomic variables and stock prices in Ghana, which shows a long-term relationship. In the Middle East, Kalyanaraman & Tuwajri (2014) examined macroeconomic factors on the stock market in Saudi Arabia. This study concludes that Saudi Arabia's stock price is driven more by domestic macroeconomic factors than global factors in the long run. In Europe, Peiró (2016) reveals that production and interest rates are the two macroeconomic factors that most influence stock prices in several European countries.

RESEARCH METHOD

The data were analyzed using the Vector Autoregression (VAR) and Vector Error Correction Model (VECM) methods if the data was stationary and cointegrated. The data analysis starts from the data stationarity test to ensure that the estimated time series econometric model can be processed, namely the fulfillment of the assumption that the data are typically distributed or stable (stationary) on the variables forming the regression equation. The results of the stationary series will be continued with data processing using VAR with the standard method. Meanwhile, non-stationary series results will lead to two choices, namely VAR or VECM. Then proceed with optimal lag testing to determine the optimal amount of lag used in the model. Next is the VAR stability test to test the stability of the model.

Furthermore, a cointegration test was conducted to determine whether the non-stationary variables were at the cointegrated level or not. Then, the Vector Error Correction Model (VECM) model is used in the non-structural VAR model. The time-series data is stationary in the differential and cointegrated data. This shows a relationship between variables. The VECM model, a non-structural VAR model, is called a restricted VAR model. The specification of the VECM model restricts the long-term behavioral relationship between variables to converge into a cointegrated relationship but allows

dynamic changes in the short run. Thus, error correction will occur because if there is a deviation in the long term, it will be corrected gradually through short-term partial adjustments (Majid et al., 2009). Then perform the Impulse Response Function (IRF), a method to track the response of an endogenous variable to a particular shock. The final step is to perform Forecast Error Variance Decomposition (FEVD), a method to see changes in a variable indicated by changes in error variance influenced by other variables. The data used in this study is secondary data in monthly time series from January 2015 to December 2020. Next, the estimation process will be carried out by carrying out model specifications that can be formulated in this study as follows:

$$\Delta LN_JII_t = \alpha + \sum_{i=1}^p \beta_{1i} \Delta LN_KL_{t-i} + \sum_{i=1}^p \beta_{2i} \Delta LN_SET_{t-i} + \sum_{i=1}^p \beta_{3i} \Delta LN_SP500_{t-i} + \sum_{i=1}^p \beta_{4i} \Delta LN_SSE_{t-i} + \sum_{i=1}^p \beta_{5i} \Delta INF_{t-i} + \sum_{i=1}^p \beta_{6i} \Delta LN_COP_{t-i} + \sum_{i=1}^p \beta_{7i} \Delta LN_EX_{t-i} + \sum_{i=1}^p \beta_{8i} \Delta LN_M2_{t-i} + \sum_{i=1}^p \beta_{9i} \Delta D_COV_{t-i} + \epsilon_t$$

Table 1: Research Variables

Variable	Symbol	Proxy	Source
JII Indonesia Stock Index	LN_JII	JII Stock Index	Yahoo Finance
Malaysia Stock Index	LN_KL	KLCI Stock Index	Yahoo Finance
Thailand Stock Index	LN_SET	SET Saham Stock Index	Yahoo Finance
United States Stock Index	LN_SP500	S&P 500 Stock Index	Yahoo Finance
China Stock Index	LN_SSE	SSE Stock Index	Yahoo Finance
Inflation	INF		Bank Indonesia
Crude Oil Price	LN_COP	WTI World Crude Oil Prices	Yahoo Finance
Exchange rate	LN_EX	Rupiah to USD Rates	Yahoo Finance
Money Supply	LN_M2	Amount of Money in Wide Circulation (Billion Rp)	Bank Indonesia
Dummy Covid-19	D_COV	0 = Period before Covid-19 (January 2015 - February 2020)	
α	= Intersep	ϵ	= error
β	= Koefisien	t	= Tahun ke-t
i	= Long lag (ordo) (i=1,2,3...)		

RESULT AND DISCUSSION

Stationarity Test Results

The first step is to test the stationarity of all variables. The data stationarity test was carried out to see whether there was a unit root among the variables based on the Augmented Dickey-Fuller (ADF) test at the level and first difference. If the statistical ADF value is less than the MacKinnon Critical Values value, the data is stationary at a predetermined significance level. The stationarity test can also be seen from the probability value of the ADF being less than the

fundamental level. Stationary test results can be seen in the following table.

Table 2: Stationarity Test

Variable	ADF Value	
	Level	1st Difference
LN_JII	-0.306232	-7.685857
LN_M2	3.336912	-8.748864
INF	-2.225249	-6.506457
LN_EX	0.502467	-8.847832
LN_COP	-0.159067	-7.022306
LN_KL	-0.374727	-7.743491
LN_SET	-0.244098	-7.914444
LN_SSE	0.115938	-6.625014
LN_SP500	1.726745	-8.666374
MacKinnon critical values:	1% level	-2.585405
	5% level	-1.943662
	10% level	-1.614866

Note: Bold indicates that the data is stationary at the 5% level

Based on the test results, the stationary variable at the level is inflation (INF). Then the unit root test is continued at the first difference level. After all the variables were tested for the unit root in the first difference with the ADF test, the test results showed that all the variables were stationary at the first difference level. From the test results, it can be concluded that the data does not contain unit roots in the first difference.

Optimum Lag Test Results

The optimum lag test is essential because it helps identify how long one variable reacts to other variables and eliminates autocorrelation problems. Lag length testing can be done using the available information criteria, namely the Likelihood Ratio (LR) criteria, Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Information Criterion (SC), and Hannan-Quin Criterion (HQ).

Based on the optimum lag test results on the tested variables, the optimum lag in the equation is at lag two based on the LR, FPE, and AIC tests. The lag was chosen to obtain a significant VECM estimation result and an adjustment from the short to the long term. The optimum lag test results can be seen in the table below.

Table 3: Optimum Lag Test Results

Lag	LogL	LR	FPE	AIC	SC	HQ
0	1093.860	NA	1.07e-26	-31.41623	-31.09245*	-31.28778*
1	1184.238	151.9392	1.46e-26	-31.13732	-27.57571	-29.72431
2	1303.668	166.1639*	9.87e-27*	-31.70052*	-24.90107	-29.00295

Note: An asterisk (*) indicates the lag has been optimum based on the Akaike Information Criterion (AIC) criteria

VAR Stability Test Results

The VAR stability test was carried out by calculating polynomials' roots and functions, known as roots of characteristic polynomials. If all the origins of

the polynomial function are in the unit circle or if the absolute value is < 1 , then the VAR model is considered stable so that the resulting Impulse Response Function (IRF) and Forecast Error Variance Decomposition (FEVD) are valid.

Table 4: VAR Stability Test Results

Lag	Module Range	
Lag 2	0.777891	0.552606
	0.777891	0.552606
	0.754910	0.502744
	0.754910	0.502744
	0.715610	0.476523
	0.715610	0.476523
	0.633010	0.445115
	0.633010	0.445115
	0.575346	0.439744
	0.575346	0.439744

Cointegration Test Results

The cointegration relationship in a system of equations implies that there is an error correction model that describes the short-term dynamics consistently with the long-term relationship in the design. The cointegration test is carried out using the Johansen Cointegration Test method by comparing the trace statistic value to the critical value. If the value of the trace statistic is greater than the critical value, then there is cointegration in the model. In this study, there are two cointegration equations.

Table 5: Cointegration Test Results

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.651300	297.6079	239.2354	0.0000
At most 1 *	0.553578	224.9135	197.3709	0.0010
At most 2 *	0.524934	169.2655	159.5297	0.0132
At most 3	0.449600	117.9087	125.6154	0.1340
At most 4	0.312933	76.70818	95.75366	0.4804
At most 5	0.268149	50.81083	69.81889	0.6022
At most 6	0.211637	29.27054	47.85613	0.7554
At most 7	0.115618	12.86260	29.79707	0.8977
At most 8	0.057282	4.384842	15.49471	0.8701
At most 9	0.004550	0.314667	3.841466	0.5748

VECM Analysis

After the cointegration test has been carried out and proven that each equation has cointegration, the analysis of the responsiveness of the international stock index and macroeconomics to the JII index uses the VAR modeling and the VECM estimation approach. Later, the processed VECM results will provide two main estimation outputs: measuring cointegration or the effect of long-term balance between variables and measuring error correction or the speed at which these variables move towards their long-term equilibrium. In this study, the significance used was at the five percent significance level.

Table 6 VECM Analysis Results

LONG TERM					
Variable	Coefficient	T-Statistics	Variable	Coefficient	T-Statistics
LN_KL(-1)	-0.271958	[-1.65295]	LN_COP(-1)	0.0054	[0.07066]
LN_SET(-1)	0.28608	[1.79564]	LN_EX(-1)	-1.184264	[-3.74348]
LN_SP500(-1)	-0.295577	[-2.28402]	LN_M2(-1)	0.73205	[3.93749]
LN_SSE(-1)	0.39146	[3.86803]	D_COV(-1)	-0.277071	[-5.82967]
INF(-1)	-0.029833	[-3.66087]	C	5.66051	
SHORT TERM					
Variable	Coefficient	T-Statistics	Variable	Coefficient	T-Statistics
CointEq1	-0.1572	[-0.92821]	D(INF(-1))	-0.01567	[-0.85955]
D(LN_JII(-1))	0.344334	[1.41704]	D(INF(-2))	-0.00359	[-0.18526]
D(LN_JII(-2))	0.316253	[1.20680]	D(LN_COP(-1))	0.087869	[1.22421]
D(LN_KL(-1))	0.286038	[0.91958]	D(LN_COP(-2))	0.071553	[1.18577]
D(LN_KL(-2))	-0.33464	[-1.21722]	D(LN_EX(-1))	-0.46931	[-0.94877]
D(LN_SET(-1))	0.165501	[0.61657]	D(LN_EX(-2))	0.910222	[1.86690]
D(LN_SET(-2))	0.204257	[0.76492]	D(LN_M2(-1))	0.278368	[1.33084]
D(LN_SP500(-1))	-0.47991	[-1.68175]	D(LN_M2(-2))	-0.10481	[-0.47645]
D(LN_SP500(-2))	-0.42369	[-1.45121]	D(D_COV(-1))	0.279922	[3.59767]
D(LN_SSE(-1))	-0.11277	[-0.92705]	D(D_COV(-2))	-0.12039	[-1.22854]
D(LN_SSE(-2))	0.059388	[0.49399]	C	0.001941	[0.25900]

Based on the VECM estimation results in the table above, it can be seen that in the short term, the only significant variable affecting the JII index is the Covid-19 dummy variable at lag 1. Then, in a long time, the variables of money supply (M2), inflation (INF), an exchange rate (EX), the United States stock index S&P 500 (SP500), the Chinese stock index (SSE), and the Covid-19 dummy significantly affected the JII index.

Impulse Response Function

In identifying the response of the international stock index and macroeconomic variables to the JII index, the Cholesky Decomposition standard is used. Cholesky Decomposition aims to generate impulse responses that depend crucially on the order of variables in the system. In this study, the timeframe used in analyzing international stock indices and macroeconomics against the JII index is projected in the next 24 months (two years).

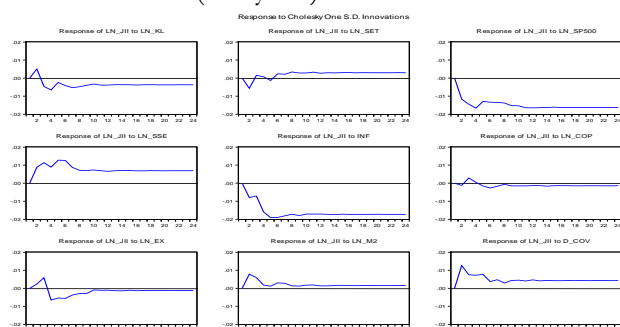


Figure 1: IR Analysis Results

In the picture above, it can be seen that the JII index has not responded to the shocks of all international stock indexes and macroeconomic variables in the first month. In the 2nd month, the variables that negatively reacted to the JII index were INF, COP, SET, and SP500. These variables continue to provide negative responses until the end of the observation period except for the SET variable. Furthermore, the variables that responded positively to the JII index in the 2nd month were EX, M2, KL, SSE, and D_COV. These variables continued to give positive responses until the end of the observation period except for the KL and EX variables. All of the above variables began to reach stability in the 20th period.

Forecast Error Variance Decomposition (FEVD)

The FEVD analysis in this study aims to explain the contribution of each global and macroeconomic stock index variable in explaining the diversity in its influence on the JII index. FEVD observations were carried out for 24 periods (two years). FEVD results can be seen in the image below.

In the first month, the diversity of the JII index is 100 percent only influenced by the variable itself. The JII index, which is affected by other variable shocks, is only responded to in the second period. At the end of the observation, the most significant response was still affected by the JII index of 83.71 percent. At the end of the observation, the second-largest reaction was inflation (INF), which contributed 6.96 percent. The third-largest response was the United States stock index S&P 500 (SP500), contributing 5.92 percent. Furthermore, the following variables provide shock responses at the end of the observation.

Variable	Respons
LN_JII	83.7187
INF	6.965153
LN_SP500	5.926223
LN_SSE	1.607684
D_COV	0.715756
LN_KL	0.412421
LN_SET	0.214019
LN_EX	0.211559
LN_M2	0.167924
LN_COP	0.060562

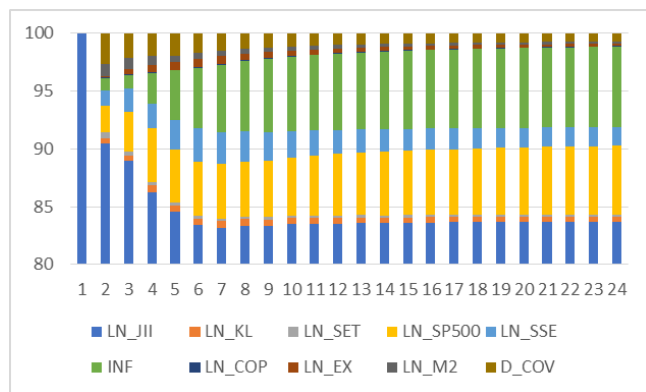


Figure 2: FEVD Output Results

DISCUSSION

From the results of the VECM estimation above, several variables experienced a significant effect on the JII stock index before and during COVID-19, one of which was inflation, which harmed the long term of the IRF results showed the same direction. These results follow the research of Qamri, Abrar-ul-haq, & Akram (2015). Christiano, Ilut, Motto, & Rostagno (2010) said that a relative increase in inflation would negatively signal investors in the capital market. The rise in inflation causes the actual consumption of the community to decrease because the value of money held by the community decreases. As a result of rising prices for goods and services, people prefer to hold back their consumption needs or save on expenses. By reducing consumption by the community, the company's sales will automatically decrease so that the profits they get will also decrease. However, in their research, Antonakakis, Gupta, & Tiwari (2017) reveal that although in general actual stock returns and inflation are negatively related, there is no guarantee that a lower inflation rate can improve the health of the stock market due to the state of the economy at a certain point in time, is governed by various channels that affect these two variables, so it is necessary to measure it first.

The exchange rate harms the long term, and the IRF results also show the same direction. These results follow the research of Adam & Tweneboah (2011). The negative relationship between the JII index and the exchange rate indicates that the depreciation of the Rupiah makes stocks unattractive for investors to invest in the Indonesian Islamic stock market. Also, the long-run negative relationship is that the price of imported goods becomes expensive for producers. As an import-dominated economy, the depreciation of the Rupiah can be seen as a scapegoat for the economy. The depreciation of the local currency makes imports more expensive than exports, which increases the production costs of importing firms. Another study from Rachmawati & Laila (2015) also states that the depreciation of the local currency raises exports and stock prices.

The money supply has a positive effect in the long term, and the results of the IRF also show the

same direction. These results are consistent with studies from Al-Tamimi, Alwan, & Rahman (2011), Kalyanaraman & Tuwajri (2014), F. Khan, Muneer, & Anuar (2013), and J. Khan & Khan (2018). The money supply has an expansive effect that can increase the company's income. This can be explained by the economic stimulus provided by money growth. The trigger commonly referred to as the firm's earnings effect is likely to result in future increases in cash flow and share prices. Another explanation put forward by J. Khan & Khan (2018) is that an increase in the money supply directly affects liquidity in the stock market. The expansion of the money supply increases the demand for money, resulting in more economic activity. Thus fluctuations in the money supply affect the investment climate in a country.

The S&P 500 index and the SSE index have a negative and positive influence on the JII stock index in the long term, respectively. The IRF results also show the same response direction for these two stock indices. These results are consistent with the research (Kenani, Purnomo, & Maoni, 2013), which shows the volatility spillover effect, which provides evidence that the Chinese stock market has a unidirectional influence on the Indonesian stock market after the financial crisis. The Chinese stock market is integrated with the Indonesian stock market. China's impressive economic growth opens up economic opportunities for Indonesian investors in trade and investment. According to Kenani et al. (2013), China became Indonesia's second-largest trading partner after Japan in 2010.

Similarly, the Indonesian economy became China's fourth-largest trading partner in the Asian region in 2010. The recent increase in trade relations between China and Indonesia has also deepened investment relations between the two countries. Therefore, the stock markets of Indonesia and China are essential targets for investors from both countries to diversify their portfolios.

The research results above ultimately resulted in a negative relationship between Dummy COVID-19 and the JII stock index in the long term. These results prove previous research by Ibrahim, Mohammad, & Mohammed (2020) and K. Khan et al. (2020) that COVID-19 harms the JII stock index in Indonesia.

CONCLUSION

This study explores the effect of Covid-19 and various macroeconomic variables on Islamic stock prices in Indonesia, namely the Jakarta Islamic Index (JII), by analyzing monthly data from 2015 to 2020 using the Vector Error Correction Model (VECM) to investigate the short-term and long-term effects. Of each macroeconomic variable and international stock index to the JII index. The results showed that the Covid-19 dummy variable significantly impacts the JII

index in the short term. Meanwhile, inflation, exchange rates, money supply, the United States S&P 500 index, China's SSE index, and the Covid-19 dummy variable significantly affect the JII index in the long term. Long-term results show that inflation, exchange rates, the United States S&P 500 index, and the Covid-19 dummy variable harm the JII index.

On the other hand, the money supply and China's SSE Index positively affect the JII index. Overall, these findings show that the dummy variable Covid-19 significantly impacts the JII index in the short term. Meanwhile, inflation, exchange rates, money supply, the United States S&P 500 index, China's SSE Index, and the Covid-19 dummy variable significantly affect the JII index in the long run.

This finding contributes to research on the economic impact of the pandemic by providing empirical evidence that COVID-19 harms the JII stock index in Indonesia, which is one of the countries with the most favorable cases in Southeast Asia due to the outbreak. COVID-19 is a black swan event. Its emergence, development, disappearance, and its effects' depth, extent, and intensity are all unknown. The stock market is a barometer of the economy, and the capital market reflects the overall economic situation. However, this study only references capital market trends when the COVID-19 pandemic broke out in Indonesia. It is hoped that this research will provide learning and discussion in further research.

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