Macroeconomic Variable Stability during Covid-19 Pandemic on Sharia Stock Index in Indonesia and Malaysia

Naji Hatul Mutoharo, Abdul Hakim

***Abstract*— Globalization is one of the reasons for the strengthening of interaction and integration of countries around the world, one of which is through the transmission of capital markets. The COVID-19 pandemic, which has spread throughout the world, has had a considerable impact on almost all countries. This study aims to determine the impact received by the Sharia stock index in Indonesia and Malaysia, due to shocks in macroeconomic variables during the COVID-19 pandemic. The macroeconomic variables used are world oil prices, gold prices, the dow jones index, and currency exchange rates. The Jakarta Islamic Index (JII) as the dependent variable represents the Sharia stock index in Indonesia, and Malaysia is represented by the FTSE Bursa Malaysia Hijrah Syariah (FTSEMHS). Using the vector error correction model (VECM), shows the results that during March 1, 2020 to February 28, 2021, in the long and short term there is a relationship between the independent and dependent variables. Based on the analysis of variance decomposition, sequentially the variables that give the largest contribution to JII are JII, DJIA, OIL, GOLD and IDR, while in FTSEMHS, namely FTSEMHS, GOLD, MYR, OIL, and DJIA.**

***Index Terms*— FTSEMHS, GOLD, MYR, OIL, and DJIA.**

I. INTRODUCTION

The emergence of COVID-19 cases which initially only occurred in Wuhan, China, quickly spread to almost all countries in the world. The number of positive cases and victims that continues to increase drastically globally, is the reason for WHO to designate this case as a global pandemic. Indonesia was first announced that there were positive cases of COVID-19 on March 2, 2020 as many as 2 cases which then continued and continued to increase eery day. Until the end of February 2021, the total number of COVID-19 cases in Indonesia was 1,334,634 with a death toll of 36,166 or 2.71% (www.worldometer.info, 2021).

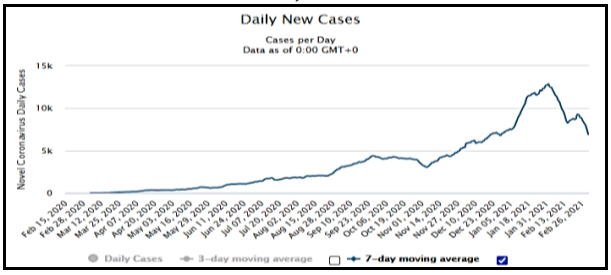

Figure 1.1 Daily Case Addition of COVID-19 in Indonesia
Source: oronavirus Updatewww.worldometers.info

Naji Hatul Mutoharo, Departemet of indonesian islamic university
Abdul Hakim, Departemet of indonesian islamic university

Just like other countries, Malaysia has also experienced a COVID-19 pandemic. Until the end of February 2021, there were 300,752 total cases with a death rate of 1,130 people. This number is certainly much smaller than the cases that occurred in Indonesia, considering that Indonesia's population is almost 9 times the total population in Malaysia as of 2020 (www.worldometers.info.com, 2021).

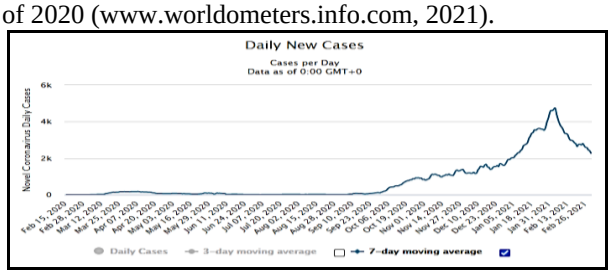

Figure 1.2 Addition of Daily Cases of COVID-19 in Malaysia.
Source: Coronavirus Updatewww.worldometer.info

The COVID-19 pandemic that occurred did not only affect the health sector, but also had an impact on various aspects, including the economy. Several countries are experiencing economic problems due to the arrival of an unexpected pandemic. One of the reasons for the emergence of economic problems is the implementation of restrictive policies by several countries from several trips originating from abroad (lockdown). Other policies implemented include social distancing, banning public events, and closing other public facilities including schools, hotels and restaurants.(Fongang & Ahmadi, 2020). In addition, the handling of COVID-19 also requires quite large costs that must be met so that it adds to the burden of state spending.

On a macro level, several variables are also affected by the COVID-19 pandemic. Before the COVID-19 pandemic occurred, countries in the world had experienced pandemics and epidemics such as SARS, AIDS, Spanish Flu, and others, which had almost the same pattern as the current pandemic. Pandemics or epidemics that have occurred in the past have also caused the country's economy to fall(Fongang & Ahmadi, 2020). According to the International Monetary Fund (IMF) economic report, it is estimated that all countries (except China) will experience negative economic growth. This prediction continues until 2021, where all of them are expected to experience a decline of 1.8 percent for developed countries and 3.6 percent for developing countries.(IMF, 2020)

The COVID-19 pandemic has also affected the supply and

demand of international commodity trade. In the first quarter of 2020, the amount of oil demand decreased by 5% and is expected to decline by 20%. On the other hand, oil inventories are approaching full-capacity in June 2020(World Bank, 2020). Saudi Arabia as one of the main suppliers who play a role in world oil trade immediately took a stand by starting a trade war in March 2020, by increasing crude oil inventories in the world. This causes oil prices to fall by 20%(Albulescu, 2020). Although in 2021, a vaccine for COVID-19 has been found, but for the recovery in the opening of access to travel between countries (including tourism) it is expected to experience slow changes, thus slowing the normalization of oil prices(IMF, 2021).

In contrast to trading in oil commodities, during the pandemic the price of gold actually increased. Gold as an investment tool that is liquid, safe and has a fairly good return, has become a preferred choice during the pandemic, when compared to other investments, considering that gold is a safe-haven investment. During January to early May 2020, the price of gold increased from $1,517.3 to $1,712.39 per ounce, or an increase of 12.85%(Yousef & Shehadeh, 2020). Further research in the period before and during the pandemic shows that investing in gold remains a safe investment when compared to other investments, including investing in the stock market.(Salisu et al., 2021).

It was recorded that since the beginning of 2020, the exchange rates of developing countries and several developed countries experienced a sharp depreciation, especially against the US Dollar which strengthened to 8.5% in early April 2020. Meanwhile, the yen also strengthened by around 5% and the euro by 3. %(IMF, 2020). One of the reasons for the weakening of the currencies of several countries, especially developing countries was the need for funding using the US Dollar standard, both by corporations and the government. In the Foreign Exchange (FX) swap market, there is an increasing demand for US Dollar-based foreign funding from local companies, including in Indonesia and the Philippines. The increasing debt with the US Dollar, it will weaken the value of the country's currency against the US Dollar(OECD, 2020).

The capital market is one of the economic sectors that has also been affected by the COVID-19 pandemic. Through a press release issued by the Indonesia Stock Exchange (IDX), it was informed that the Jakarta Composite Index (JCI) has received the impact of this pandemic. At the end of February 2020, the JCI decreased by 13.44% or 5,452,704. Within ASEAN, the composite stock index weakened in all countries with the largest decline being experienced by Thailand, followed by Indonesia, the Philippines, Vietnam, Malaysia and Singapore. The respective declines were -15.15%, -13.44%, -13.15%, -8.2%, -6.68% and -6.57%. Even on Thursday, March 12, 2020, the IDX made a temporary freeze on trading (trading halt), due to a significant decline in the JCI, which was 5.01%.

Indonesia and Malaysia are one of the countries that have become the object of study in the field of Islamic economics. The capital market itself is one part of the Islamic economy that continues to be developed, including in Indonesia. During the pandemic, several stocks that were also listed in Sharia securities also experienced turmoil. It was recorded that in March 2020, the Jakarta Islamic Index (JII) as one of the sharia stock indexes in Indonesia gave a negative response when the COVID-19 case was discovered in Indonesia. JII experienced a drastic decline to reach 400 points. In the next quarter, it recorded an increase, although it decreased again in the 3rd quarter (Indonesian Stock Exchange Press Release, 2020). In the midst of uncertain market conditions due to COVID-19, recorded in 2020, Indonesia won the title of "The Best Islamic Capital Market" at the international Global Islamic Finance Awards (GIFA) in Pakistan. As of August 2020, the percentage of Sharia shares reached 63% of the total shares listed on the IDX. In addition, the capitalization of Sharia shares reaches 50% with trading volume reaching 65% of the total trading on the IDX. (Press-Release Indonesia Stock Exchange, 2020)

The Malaysian capital market has also been impacted by the COVID-19 pandemic. The FTSE Bursa Malaysia KLCI index fell by 15% compared to the end of 2019, from 1588,8 at the end of December 2019 to 1350.90 at the end of March 2020(World Bank, 2020). The weakening of the domestic financial market, has an effect on the Malaysian currency. In the first quarter of 2020, the Ringgit depreciated against the US Dollar by 4.9%, as did the currencies of other ASEAN countries.(BNM, 2020a). However, at the end of June, the FTSE Bursa Malaysia KLCI experienced an 11.1% increase to 1501.0 points(BNM, 2020).

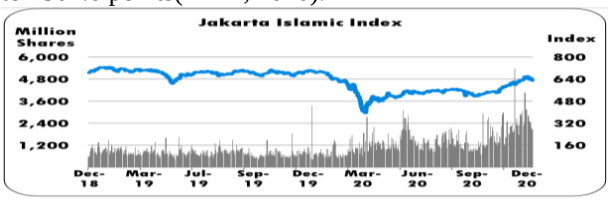

Figure 1.3 Fluctuations in the Jakarta Islamic Index December 2018-2020

Source: Indonesia Stock Exchange

For this reason, through this study, the author intends to determine the effect of macroeconomic factors in the form of world oil prices, world gold prices, exchange rates and the Dow Jones Index on Islamic stock indexes in Indonesia and Malaysia. Furthermore, it will be analyzed whether the condition of the macroeconomic variables that experience turmoil will have an effect in the long term or only in the short term.

1.1 Formulation of the problem

1. Do the variables of crude oil prices, world gold prices, exchange rates and the Dow Jones Index have a relationship with the Jakarta Islamic Index (JII) in the short and long term?
2. Do the variables of crude oil prices, world gold prices, exchange rates and the Dow Jones Index have a relationship with the FTSE Malaysia Hijrah Sharia Index in the short and long term?
3. How did JII and FSTE Malaysia Hijrah Sharia Index respond to the shock that occurred in the macro variables of crude oil prices, world gold prices, exchange rates and the Dow Jones Index?

1.2 Research purposes

1. Observing and analyzing the relationship of

macroeconomic variables to the Jakarta Islamic Index in the short and long term.
2. Observing and analyzing the relationship of macroeconomic variables to the FTSE Malaysia Hijrah Sharia Index in the short and long term.
3. Analyzing the response of JII and the FTSE Malaysia Hijrah Sharia Index in the event of a shock on macroeconomic variables.

II. THEORETICAL BASIS

a. Invest in Islam

The development of the times that occurred also had an impact on the increasingly complex economic transactions carried out by the community, one of which was investment. Investment activities can be carried out by investing directly or indirectly through investment companies. With the intermediary from the investment party, it can help investors with capital and knowledge that are not yet qualified to be able to gain profits through portfolio formation (Hartono, 2009).

In addition, the form of investment can be divided into two, namely financial and real investment. Financial investment can be interpreted as an indirect investment or using certain financial instruments. This form of investment can be found in bonds, stocks, mutual funds and so on. Whereas in real investment, investors will invest in the real sector, such as investing in factory construction, franchise businesses and others (Iman, 2008).

The basic rule in muamalah is that everything is basically allowed, until there is a proof (Al-Qur'an or as-Sunnah) that forbids it. The prohibition of muamalah transactions in Islam is caused by three things, namely haram because of the substance (haram li dzatihi), haram other than the substance (haram lighairihi) and haram because the contract is invalid (Muhammad, 2014).

Investment in various forms of financial institutions, of course, cannot be separated from various shortcomings. In order to maximize the expected profit instantly, it is not uncommon for investors to speculate on the investment issued. Islamic teachings prohibit the element of speculation in muamalah transactions carried out by a Muslim. Speculation in question is the aim of obtaining the maximum profit by abandoning the sense of responsibility and the rule of law for the sake of obtaining worldly gains. Especially in the capital market, efforts to eliminate the element of speculation from investment activities are carried out by setting a holding period or a minimum period of time for shares to be held by investors. This provision causes an investor to be unable to buy and sell shares at any time in a short period of time.

b. Capital Market and Sharia Capital Market

The capital market is one of the financial institutions that brings together investors with companies that need investment from outsiders to meet their funding needs. Companies that have gone public can buy and sell their securities on the secondary market in the form of the capital market or stock market. As for the capital market, the formation of stock prices or securities in each company that has been listed on the stock exchange, is influenced by supply and demand for these securities. It can be said that the price of each company's stock, is shaped by the market from the supply and demand process. (Hartono, 2009)

In general, success in forming stock prices and capital market stability is influenced by (Husnan, 2005):

1. Securities Supply

   The number of companies that issue securities to increase the company's capital is one of the determining factors for capital market conditions.

2. Request for securities

   The ability and interest of the public to invest by buying securities that have been offered by companies listed on the capital market are the determining factors for fluctuations in stock prices and market stability.

3. Political and Economic Conditions

   The political and economic conditions of a country will affect the supply and demand for securities in the capital market. The more secure the political and economic conditions.

4. Legal and regulatory issues

   The power of law as well as regulations that protect investors and companies that will issue securities will be considered in carrying out supply and demand in the capital market.

Technological developments and globalization encourage the integration of economic activities between countries, including activities in the capital market. In international capital markets, apart from domestic risks in the form of changes in stock prices, investors are also exposed to risks from changes in foreign exchange. So it can be said that the risks faced by foreign investors tend to be higher than domestic investors (Husnan, 2005).

In the Islamic financial system, the prohibition against the practice of interest and the encouragement to do profit-loose sharing is one of the important discussions in this system. To ensure justice for the parties involved, the Islamic financial system provides ethical and moral guidelines and rules for investment behavior (Askari, et.al, 2014).

The Shariah Supervisor Board of Dow Jones Shariah Index, enforce standards that also apply in several countries including Indonesia for companies that can trade in the Islamic capital market to meet the following criteria (Mohammad, 2014):

1. Industrial companies are not allowed to engage in fields that are contrary to Islamic law, such as non-halal food production, alcohol production, weapons manufacturing and others.
2. Companies with a debt-to-equity ratio of more than 30%
3. Companies that have high interest income.

c. Jakarta Islamic Index and FTSE Bursa Malaysia Hijrah Syariah

The condition of the Indonesian population, with most of them embracing Islam, does not make Indonesia a center for Islamic economic development, including in the capital market. The entry of Islamic economics in this

field, one of which was marked by the establishment of a Sharia capital market which was an agreement between the Capital Market Supervisory Agency (BAPPEPAM) and the National Sharia Council – Indonesian Ulema Council (DSN-MUI) on March 14 and 15, 2003. In fact, investment activities Sharia-based funds emerged in Indonesia in 1997, marked by the issuance of Sharia mutual fund instruments (Muhamad, 2014).

Jakarta Islamic Index (JII) is one of the Islamic stock indexes in Indonesia which was established on July 3, 2000. This index consists of 30 Sharia stocks which are considered the most liquid. The valuation of shares included in JII is carried out with a review every May and November every year. The criteria for stocks included in the JII index list are (Sharia Index, www.idx.co.id):

a. Included in the list of the Indonesian Sharia Stock Index (ISSI) at least in the last 6 months
b. From ISSI, 60 of the most liquid Sharia shares will be selected in the past year

Compared to Indonesia, Malaysia, with a much smaller Muslim population, is experiencing a fairly rapid development of the Islamic economy. In investment activities in the Sharia capital market, Malaysia has established a Sharia capital market in 1990 and has grown rapidly to date (Muhamad, 2014). FTSE Bursa Malaysia Hijrah Shariah Index (FBMHS) is one of the Sharia stock indexes in Malaysia. This stock index is part of the FTSE Bursa Malaysia Gold Index. Consisting of shares of 30 of the largest companies in the Malaysian capital market, the index consists of companies that meet the following criteria (Overview Bursa Malaysia Index):

a. Meets liquidity and investable standards according to global standards from FTSE
b. Passed Shariah screening from Yasaar's International Shariah Screening
c. In addition, it must also meet the requirements of the Security Commission's Shariah Advisory Council (SAC) in Malaysia

The movement of the stock index cannot be separated from the rise and fall of the majority of shares in the capital market. The factors that can affect stock price movements are (Alwi, 2003):

1. Internal Factors (Micro)

Factors in the microenvironment that affect stock prices include:

a. Announcements related to marketing, production and sales such as advertisements, contract details, new products, price changes, product safety reports, and so on.
b. Funding Announcements, including announcements related to equity and debt, leasing, stock split or merger, share purchase, and so on.
c. Announcements regarding changes to the management board of directors
d. Announcement of merger take diversification, such as merger, acquisition, External Factors (Macro)

d. Contagion Theory

Several studies have proven that the economic condition of a country can be influenced by conditions that occur in other countries. Economic conditions that occur in developed countries tend to have an influence on the economic development of developing countries. The stock index as one of the macroeconomic variables, allows it to be influenced by the movement of the stock index of other countries(Robiyanto & Aldhi, 2018). An integrated world economy, providing opportunities for investment to obtain acceptable returns and risks(Bekaert et al., 2007).

*Contagion effect*become one of the risks because of the integration between capital markets. The collapse of one capital market can cause the collapse of other integrated capital markets, especially in countries that are in the same region(Suganda & Soetrisno, 2016). The contagion effect can be in the form of changes in the stock price of a country caused by changes in other countries, one of which is the fall of the New York stock market, causing stock prices to fall throughout the world in 1987. The capital market in the USA is one of the most influential capital markets in the world. Changes in the capital market in the USA can have an impact on the development of capital markets in other countries. Globalization and expansion of financial markets are one of the reasons for increasing integration between global financial markets, including influencing returns and volatility in capital markets, thereby increasing potential sources of capital.(Mulyadi, 2012).

Research Framework Model

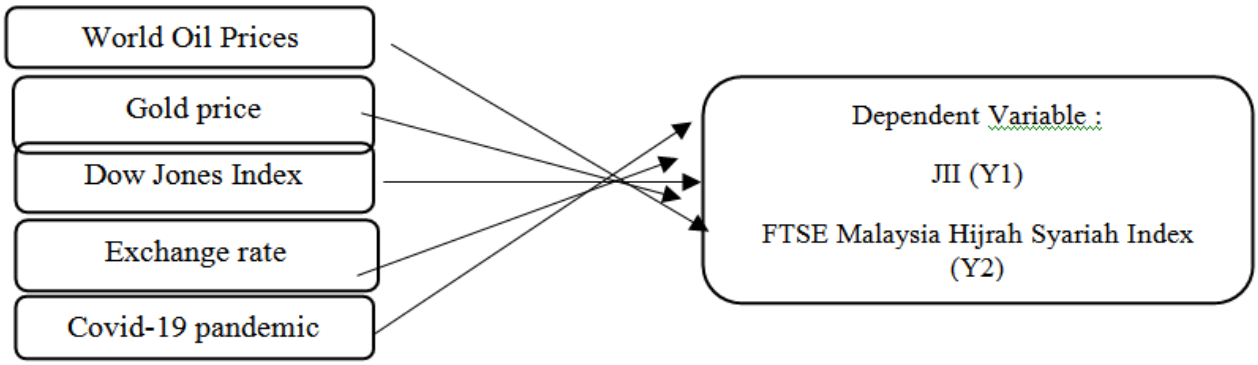

Figure 2.2 Research Framework

III. RESEARCH METHODS

a. Population and Sample

This study will observe the population in the form of Islamic stock indexes in Indonesia and Malaysia. To simplify the research that will be carried out, a sample is selected, namely JII (Jakarta Islamic Index) to represent the population of the Sharia Stock Index in Indonesia, and for the population of the Malaysian Sharia index, the sample is the FTSE Malaysia Hijrah Shariah Index. The sample selection is based on the fact that the two indices are considered representative of the population because they are an index consisting of the 30 largest and most liquid companies that have passed the Sharia screening of each country. The research period chosen was during the COVID-19 pandemic, from March 1, 2020 to February 28, 2021.

b. Data analysis method

This study will use data analysis methods in the form of Vector Auto Regression (VAR) or Vector Error Correction Model (VECM). The VAR method will be used if the data used is not cointegrated and is stationary. While the VECM method will be used when there is a cointegration of the data under study and is stationary. Using this analytical method, this study will look at the contribution and response of the variables of world oil prices, gold prices, exchange rates, and the Dow Jones Index to Sharia indices in Indonesia and Malaysia, especially with the influence of the COVID-19 pandemic that has emerged since 2020.

IV. DATA AND DISCUSSION

a. Descriptive Statistical Analysis

This study will discuss the relationship between macro variables, namely world oil prices (OIL), world gold prices (GOLD), Dow Jones Index (DJIA), exchange rates (IDR/MYR) against the Jakarta Islamic Index (JII) and FTSE Malaysia Hijrah. Sharia (FTSEMHS).

The results contained in table 1 show a statistical description of the observed variables with the dependent variable in the form of the Jakarta Islamic Index. There were 232 samples studied from March 1, 2020 to February 28, 2021. JII had an average of 561,4910, with the lowest value of 393,8600, recorded on March 24, 2020, three weeks since the first recorded case of COVID-19 occurred in Indonesia. While the highest value occurred on January 14, 2021 at 671,5900. The standard deviation of the JII variable was recorded at 55,83422.

During the research period, world oil prices (OIL) were recorded to reach the lowest price of -33.61000 US dollars per barrel, namely on April 20, 2020. While the highest price was reached at the end of the research period, namely on February 25, 2021 at 64.80000 US dollars per barrel. The average world oil price during the period was 40,27560 US Dollars per barrel with a standard deviation of 12,20753.

The world gold price (GOLD) has an average of 1813,278 US Dollars per ounce with the lowest price of 1477,300 US Dollars per ounce on 18 March 2020. While the highest price reached 2051,500 US Dollars per ounce on 6 August 2020. Standard deviation of the GOLD variable amounted to 113,0383.

The Dow Jones Index (DJIA) variable reached the lowest value of 18591.93 on March 23, 2020 and the highest value of 31961.86 on February 24, 2021. The average value for the DJIA variable was 27260.15 with a standard deviation of 2895.390.

The rupiah exchange rate against the USD was recorded to reach the highest value throughout the study period of IDR 16,741.01 per USD on April 2, 2020. While the lowest value was IDR 13,875.01 on February 16, 2021. rupiah against USD amounted to Rp 14,645.02 per USD with a standard deviation of 618,5244.

Table 1.
Descriptive Statistics (Depend Variable : JII)

	JII	GOLD	DJIA	OIL	IDR
mean	561.4910	1813,278	27260.15	40.27560	14645.02
median	551.3450	1835,600	27620.74	41.43000	14596.01
Maximum	671,5900	2051,500	31961.86	64.80000	16741.01
Minimum	393.8600	1477,300	18591.93	-33.61000	13875.01
Std. Dev.	55.83422	113.0383	2895,390	12.20753	618.5244
Skewness	0.009127	-0.642776	-0.562296	-1.237070	1.436181
Kurtosis	2.945357	3.158898	2.808517	8.045286	4.856380
Jarque-Bera	0.032084	16.21963	12.57996	305.2374	113.0672
Probability	0.984086	0.000301	0.001855	0.000000	0.000000
Sum	130265.9	420680.5	6324355.	9343.940	3397645.
Sum Sq. Dev.	720133.2	2951637.	1.94E+09	34424.49	88374245

Observations	232	232	232	232	232

source: processed data

Table 2 below shows the output of statistical descriptions on the variables studied, with the dependent variable being the FTSE Bursa Malaysia Hijrah Syariah Index (FTSEMHS). In this second model, there are 236 research samples.
Throughout March 1, 2020 to February 28, 2021, the FTSEMHS variable obtained the highest value of 15,785.18 on August 6, 2020, while the lowest value occurred on March 19, 2020, worth 10,607.39. The average FTSEMHS index is 13,984.01 with a standard deviation of 1,246,102.
In the world oil price (OIL) variable, the average oil price during the study period was 40,12915 USD per barrel with a standard deviation of 12,10561. On February 25, 2021, world oil prices reached their highest value at 64.8 USD per barrel. Meanwhile, the lowest price was -33.61000 US dollars per barrel, which was on April 20, 2020.
On August 6, 2021, the highest price variable for world gold (GOLD) reached 2051,500 US Dollars per ounce. On the other hand, the lowest price occurred on March 18, 2020 at 1477,300 US Dollars per ounce. The variable world gold price (GOLD) has an average of 1813,102 US Dollars per ounce with a standard deviation of 112,7493.
The Dow Jones Index (DJIA) variable reached the lowest value throughout the research period of 18591.93 on March 23, 2020. While the highest value of 31961.86 was on February 24, 2021. From March 1, 2020 to February 28, 2021, the average DJIA variable was 27207.30 with a standard deviation of 2901,927.
From March 1, 2020 to February 28, 2021, the average exchange rate of the Malaysian Ringgit against the USD was 4.192545 per USD. The highest exchange rate occurred on March 23, 2020 at 4,444 per USD. The lowest exchange rate touched 4.008 ringgit per USD on January 4, 2021. The standard deviation of the Malaysian ringgit exchange rate variable against the USD was 0.112836.

Table 2.
Descriptive Statistics (Dependent Variable : FTSE Malaysia Hijrah Syariah)

	FTSEMHS	GOLD	OIL	DJIA	MYR
mean	13984.01	1813.102	40.12915	27207.30	4.192545
median	14419.89	1834.950	41.40000	27517.74	4.171500
Maximum	15785.18	2051,500	64.80000	31961.86	4.444000
Minimum	10607.39	1477,300	-33.61000	18591.93	4.008000
Std. Dev.	1246,102	112.7493	12.10561	2901,927	0.112838
Skewness	-0.975121	-0.642052	-1.230034	-0.536605	0.153153
Kurtosis	2.853835	3.157782	8.118852	2.776640	1.847074
Jarque-Bera	37.61063	16,45921	317.1700	11.81641	13.99345
Probability	0.000000	0.000267	0.000000	0.002717	0.000915
Sum	3300227.	427892.0	9470.480	6420923.	989.4406
Sum Sq. Dev.	3.65E+08	2987415.	34438.27	1.98E+09	2.992123
Observations	236	236	236	236	236

Source: processed data

b. VECM Analysis

Data stationarity test

Stationarity test was conducted to see whether the variables studied were stationary at the level or first difference. In research that uses an analytical tool in the form of VAR/VECM, the data must be stationary at the first difference level. To see the stationarity of the data, a unit root test was performed using ADF (Augmented Dicky-Fuller) and PP (Philips-Perron).
The output of stationarity testing at the level level for the model with the dependent variable in the form of the Jakarta Islamic Index (JII) can be seen in Table 3. There are 5 variables that were tested with the result that all variables, namely JII, OIL, GOLD, DJIA and IDR, were not stationary at level level. This can be seen because both ADF and PP t-statistics are less than the critical value of Mac.Kinnon

Table 3.
Stationarity Test Results Level Level (Dependent Variable: JII)

Variable	ADF		PP	
	t-statistics	Prob.	t-statistics	Prob.
JII	-1.595963	0.4830	-1.462813	0.5508
World Oil Price (OIL)	-0.877363	0.7941	-1.978361	0.2963
World Gold Price (GOLD)	-2.200545	0.2068	-2.066725	0.2585
Dow Jones Index (DJIA)	-1.205321	0.6726	-1.004062	0.7521

Exchange Rate (IDR)	-1.264284	0.6464	-1.844270	0.3584
Test Critical Values (MacKinon)				
1% level	-3.458973		-3.458594	
5% level	-2.874029		-2.873863	
10%	-2.573502		-2.573413	

source: processed data

The same thing can also be seen in Table 4 which is the output of the stationarity test of the model with the dependent variable in the form of the FTSE Malaysia Bursa Hijrah Malaysia (FTSEMHS) Index. The output of this test also shows that of the five variables tested, both FTSEMHS, OIL, GOLD, DJIA and MYR are not stationary at the level level. The value of t-statistics on the five variables studied, using both ADF and PP, is less than the Mac.Kinnon critical value.

Table 4.

Stationarity Test Results at Level Level (Dependent Variable: FTSEMHS)

Variable	ADF		PP	
	t-statistics	Prob.	t-statistics	Prob.
FTSEMHS	-1.534727	0.5144	-1.545356	0.5089
World Oil Price (OIL)	-0.885336	0.7917	-2.020281	0.2781
World Gold Price (GOLD)	-2.200303	0.2068	-2.071411	0.2566
Dow Jones Index (DJIA)	-0.908510	0.7844	-0.999355	0.7538
Exchange Rate (MYR)	-0.547051	0.8782	-0.719951	0.8384
Test Critical Values (MacKinon)				
1% level	-3.458470		-3.458104	
5% level	-2.873809		-2.873648	
10%	-2.573384		-2.573298	

Source: Data processed

If the variable is not stationary at the level, then the next thing to do is to test at the first difference level. The output of stationarity testing at the first difference level for the model with the dependent variable in the form of the Jakarta Islamic Index can be seen in Table 5. The t-statistic values of ADF and PP on the five variables studied showed results that were greater than the critical value of Mac.Kinnon. So it can be concluded that all variables in the first model are stationary at the first difference level, so that the VAR/VECM test can be continued.

Table 5.

Stationarity Test Results on First Difference (Dependent Variable: JII)

Variable	ADF		PP	
	t-statistics	Prob.	t-statistics	Prob.
JII	-7.490996	0.0000	-15.05710	0.0000
World Oil Price (OIL)	-10,45128	0.0000	-26.75210	0.0000
World Gold Price (GOLD)	-9.228092	0.0000	-15.57953	0.0000
Dow Jones Index (DJIA)	-20.27372	0.0000	-20.27372	0.0000
Exchange Rate (IDR)	-11.61536	0.0000	-11.91258	0.0000
Test Critical Values (MacKinon)				
1% level	-3.459101		-3.458719	
5% level	-2.874086		-2.873918	
10%	-2.573533		-2.573443	

Source: processed data

Table 6 shows the results of the second model stationarity test with the dependent variable in the form of FTSEMHS. By comparing the t-statistic values of ADF and PP, it can be concluded that the five variables are stationary at the first difference level. This can be seen through the t-statistic value which is more than the critical value of Mac. Kinnon. For this reason, it can be continued with the next step in VAR/VECM testing.

Table 6.

Stationarity Test Results on First Difference (Dependent Variable: FTSEMHS)

Variable	ADF		PP	
	t-statistics	Prob.	t-statistics	Prob.
FTSEMHS	-15.20295	0.0000	-15.20397	0.0000
World Oil Price (OIL)	-10.55479	0.0000	-26.98251	0.0000
World Gold Price (GOLD)	-9.099327	0.0000	-15.85005	0.0000
Dow Jones Index (DJIA)	-6.818733	0.0000	-20.51012	0.0000
Exchange Rate (MYR)	-13.69959	0.0000	-13.76207	0.0000

Test Critical Values (MacKinon)		
1% level	-3.458594	-3.458225
5% level	-2.873863	-2.873701
10%	-2.573413	-2.573327

Source: processed data

i. Optimal lag test

In determining the optimal lag length, it can be done by counting the number of asterisks (*) in each lag. In Table 7, with variables in the form of JII, GOLD, OIL, DJIA, and IDR, it can be seen that the most asterisks are in the third lag. While in Table 8, with variables such as FSTEMHS, OIL, GOLD, DJIA, and MYR, in lag 3 there are many asterisks compared to other lags. So that from the two models, each has an optimal lag length, namely lag 3.

Table 7.

Optimal lag test results (dependent variable: JII)

VAR Lag Order Selection Criteria
Endogenous variables: D(JII) D(GOLD) D(DJIA) D(OIL) D(IDR)
Exogenous variables:
Date: 05/07/21 Time: 17:01
Sample: 3/02/2020 2/26/2021
Included observations: 224

lag	LogL	LR	FPE	AIC	SC	HQ
1	-5517.555	NA	2.14e+15	49.48709	49.86786*	49.64079
2	-5472,974	85.18148	1.79e+15	49.31226	50.07379	49.61965
3	-5430.736	78.81891	1.54e+15*	49.15836*	50.30065	49.61944*
4	-5408.234	40.98456*	1.58e+15	49.18066	50.70372	49.79544
5	-5394.467	24.46112	1.75e+15	49.28096	51.18478	50.04943
6	-5375,936	32.09930	1.86e+15	49.33871	51.62330	50.26088
7	-5359,416	27.87699	2.01e+15	49.41443	52.07978	50.49029

* indicates lag order selected by the criterion
LR: sequential modified LR test statistics (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Source: processed data

Table 8.

Optimal lag test results (dependent variable: FTSEMHS)

VAR Lag Order Selection Criteria
Endogenous variables: D(FTSEMHS) D(GOLD) D(OIL) D(DJIA) D(MYR)
Exogenous variables: C
Date: 05/07/21 Time: 22:13
Sample: 3/02/2020 2/26/2021
Included observations: 227

lag	LogL	LR	FPE	AIC	SC	HQ
0	-4303.409	NA	2.10e+10	37.95955	38.03499	37.98999
1	-4214.504	173.1090	1.20e+10	37.39651	37.84915*	37.57916
2	-4170.827	83.12138	1.02e+10	37.23196	38.06179	37.56681*
3	-4136,213	64.34830	9.35e+09*	37.14725*	38.35428	37.63431
4	-4111,542	4477702*	9.39e+09	37.15015	38.73438	37.78941
5	-4095,440	28.51623	1.02e+10	37.22855	39.18997	38.02001
6	-4075.379	34,64274	1.07e+10	37.27206	39.61068	38.21573
7	-4058.225	28.86654	1.15e+10	37.34119	40.05701	38.43706
8	-4036.021	36,38741	1.19e+10	37.36582	40.45884	38.61390

* indicates lag order selected by the criterion

LR: sequential modified LR test statistics (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Source: processed data

ii. Stability Test

The modeling stability test aims to show whether the model built is valid. So it is hoped that later the IRF (Impulse Response Function) test results and the decompotition variant will be valid. The stability test can be seen by looking at the modulus number. If the modulus shows a number less than 1, it is said to have passed the stability test.

Source: processed data

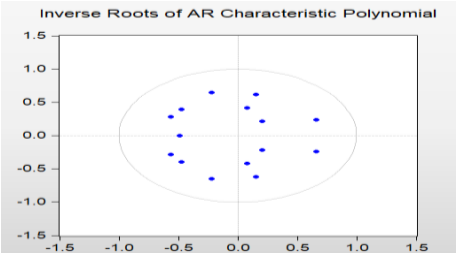

Figure 4.1.
Graph of AR Root Test Results (Dependent Variable: JII)
Source: processed data

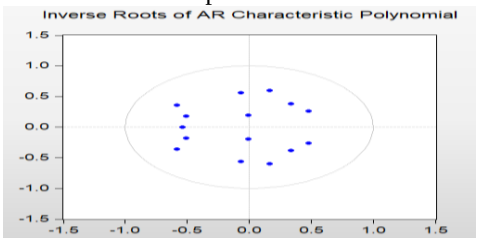

Figure 4.2.

iii. Cointegration Test

Cointegration test aims to see the relationship that occurs between the variables studied. Johansen cointegration test can be used to perform cointegration tests. To see if a variable is related to another variable, it can be done by comparing the trace statistic value or the max eigen value with the critical value. A variable can be said to have a relationship if the trace statistic or max eigen value is greater than the critical value.

Table 9 is the output of the cointegration test using the Johansen cointegration test on a model with JII as the dependent variable. When viewed from all trace statistics values, it shows a number greater than the critical value at 5% alpha. In the max-eigen value, all statistics also show a number greater than the critical value. So it can be said that there are five cointegrations that occur in the model.

Table 9
Johansen Cointegration Test Results (Dependent Variable: JII)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistics	0.05 Critical Value	Prob.**
None *	0.411904	359.4444	69.81889	0.0001
At most 1 *	0.331975	238.9380	47.85613	0.0001
At most 2 *	0.249740	147.3594	29.79707	0.0001
At most 3 *	0.208479	82.13431	15.49471	0.0000
At most 4 *	0.120170	29.06202	3.841466	0.0000

Trace test indicates 5 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistics	0.05 Critical Value	Prob.**

None *	0.411904	120.5063	33,87687	0.0000
At most 1 *	0.331975	91.57862	27.58434	0.0000
At most 2 *	0.249740	65.22512	21.13162	0.0000
At most 3 *	0.208479	53.07229	14.26460	0.0000
At most 4 *	0.120170	29.06202	3.841466	0.0000

Max-eigenvalue test indicates 5 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Source: processed data

The output of the cointegration test in the second model, with FTSEMHS as the dependent variable, can be seen in table 10. Using the johansen cointegration test, the overall trace statistic value is greater than the critical value at 5% alpha. Likewise for the max-eigen value, which is greater than the critical value. From the two criteria, the cointegration test results show that there are five relationships that occur.

Table 10.

Johansen Cointegration Test Results (Dependent Variable : FTSEMHS)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistics	0.05 Critical Value	Prob.**
None *	0.402481	388.1814	69.81889	0.0001
At most 1 *	0.342997	269.2234	47.85613	0.0001
At most 2 *	0.298459	172.1879	29.79707	0.0001
At most 3 *	0.223754	90.30403	15.49471	0.0000
At most 4 *	0.128588	31.79492	3.841466	0.0000

Trace test indicates 5 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistics	0.05 Critical Value	Prob.**
None *	0.402481	118.9580	33,87687	0.0000
At most 1 *	0.342997	97.03545	27.58434	0.0000
At most 2 *	0.298459	81.88389	21.13162	0.0000
At most 3 *	0.223754	58.50911	14.26460	0.0000
At most 4 *	0.128588	31.79492	3.841466	0.0000

Max-eigenvalue test indicates 5 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Source: processed data

i. Granger Causality Test

This study will also look at the direction of the relationship that occurs between variables. That is, whether the relationship between variables is one-way or two-way. Through the Granger causality test, a probability value will be generated that can be used as a criterion for determining the direction of the relationship. If the probability value is less than 5% alpha, it can be said that the variable has a relationship.

Table 13 shows the output of the Granger causality test conducted on the model with the dependent variable in the form of JII. The probability values of world gold prices and DJIA against JII are 0.0082 and 0.000, respectively, less than 5% alpha. However, the probability value that shows the relationship between JII to world oil prices is 0.6576 and to DJIA is 0.1508, which is greater than 5% alpha. It can be interpreted that the world gold price variable and DJIA have a one-way relationship with the Jakarta Islamic Index. So that if there is a change in the two variables, it will have an effect on JII, but this does not apply the other way around.

In addition, the variables of world oil prices and the rupiah exchange rate per USD have a two-way relationship with JII. This can be seen from the probability value of the world oil price variable against JII (0.0298) and the probability of the exchange rate against JII (0.0357) which is less than 5% alpha. Likewise, the probability of JII on oil prices (0.0013) and JII on exchange

rates (0.0058) is also smaller than alpha 5%. This means that changes in oil prices and exchange rates will affect changes in JII and vice versa. Meanwhile, changes in JII will also have an influence on changes in world oil prices and the exchange rate of the rupiah against the USD, so that the relationship between these variables is two-way.

Table 11.
Granger Causality Test (Dependent Variable : JII)

Null Hypothesis:	Obs	F-Statistics	Prob.
GOLD does not Granger Cause JII	229	4.02017	0.0082
JII does not Granger Cause GOLD		0.53670	0.6576
DJIA does not Granger Cause JII	229	11.6990	4.E-07
JII does not Granger Cause DJIA		1.78533	0.1508
OIL does not Granger Cause JII	229	3.04235	0.0298
JII does not Granger Cause OIL		5.40637	0.0013
IDR does not Granger Cause JII	229	2.90400	0.0357
JII does not Granger Cause IDR		4.27824	0.0058
DJIA does not Granger Cause GOLD	229	0.49827	0.6839
GOLD does not Granger Cause DJIA		6.65100	0.0003
OIL does not Granger Cause GOLD	229	1.68637	0.1708
GOLD does not Granger Cause OIL		1.68855	0.1703
IDR does not Granger Cause GOLD	229	6.92495	0.0002
GOLD does not Granger Cause IDR		7.90222	5.E-05
OIL does not Granger Cause DJIA	229	2.07069	0.1050
DJIA does not Granger Cause OIL		6.12070	0.0005
IDR does not Granger Cause DJIA	229	6.34318	0.0004
DJIA does not Granger Cause IDR		20.1072	1.E-11
IDR does not Granger Cause OIL	229	3.19726	0.0243
OIL does not Granger Cause IDR		4.02715	0.0081

In the model with FTSEMHS as the dependent variable, the output of the Granger causality test can be seen in table 14. The probability of the gold price and DJIA variables on the FSTE Bursa Malaysia Hijrah Syariah (FTSEMHS) Index, of 0.0012 and 0.0040, is smaller than alpha 5% . Likewise, the probability of FTSEMHS on gold and DJIA prices of 0.0025 and 0.0082 is smaller than the 5% alpha. So that it can be interpreted that there is a two-way (reciprocal) relationship between world gold prices and the DJIA against the Jakarta Islamic Index.

In the world oil price variable, the probability of JII is 0.0742, greater than 5% alpha. Meanwhile the probability of JII on the oil price is 0.1087, which is also higher than the 5% alpha. So that it means that there is no relationship between the OIL variable and JII, and vice versa.

The probability of the Malaysian ringgit exchange rate per USD against FTSEMHS is 0.0920, which is higher than the 5% alpha. On the other hand, the probability of FTSEMHS against the Malaysian ringgit of 0.0285 is smaller than the 5% alpha. This shows that there is a one-way relationship, where changes in FTSEMHS affect changes in the Malaysian Ringgit exchange rate against the USD, but not vice versa.

Table 12.
Granger Causality Test (Dependent Variable : FTSEMHS)

Null Hypothesis:	Obs	F-Statistics	Prob.
GOLD does not Granger Cause FTSEMHS	233	5.48700	0.0012
FTSEMHS does not Granger Cause GOLD		4.92885	0.0025
OIL does not Granger Cause FTSEMHS	233	2.33975	0.0742
FTSEMHS does not Granger Cause OIL		2.04307	0.1087
DJIA does not Granger Cause FTSEMHS	233	4.56291	0.0040
FTSEMHS does not Granger Cause DJIA		4.01829	0.0082
MYR does not Granger Cause FTSEMHS	233	2.17353	0.0920
FTSEMHS does not Granger Cause MYR		3.07502	0.0285
OIL does not Granger Cause GOLD	233	1.95714	0.1213
GOLD does not Granger Cause OIL		1.86661	0.1360
DJIA does not Granger Cause GOLD	233	0.56693	0.6373
GOLD does not Granger Cause DJIA		5.25443	0.0016
MYR does not Granger Cause GOLD	233	0.43593	0.7275
GOLD does not Granger Cause MYR		13.9315	2.E-08
DJIA does not Granger Cause OIL	233	5.78471	0.0008
OIL does not Granger Cause DJIA		2.06828	0.1052
MYR does not Granger Cause OIL	233	2.69803	0.0466
OIL does not Granger Cause MYR		4.26398	0.0059
MYR does not Granger Cause DJIA	233	3.71708	0.0122
DJIA does not Granger Cause MYR		20.9415	5.E-12

Source: processed data

v. VECM Model Estimation

The estimation of the VECM model is an important part of the test, because it will see how the short-term and long-term relationships between variables are. The first model to be observed is using JII as the dependent variable, while the independent variables are world oil prices (OIL), world gold prices (GOLD), Dow Jones Industrial Average (DJIA) and the exchange rate of the rupiah against the USD (IDR). In the second model the dependent variable is changed to FTSEMHS, while the independent variables are world oil prices (OIL), world gold prices (GOLD), Dow Jones Index (DJIA) and the Malaysian ringgit exchange rate against USD (MYR).

The world oil price (OIL) variable, at lags 1,2, and 3, shows a positive relationship with the respective coefficients of 0.703537, 0.279035 and 0.051975. If there is an increase in world oil prices, in the previous one, two and three days, by one USD per barrel, it will cause an increase in the value of JII today by 0.703537, 0.279035 and 0.051975, respectively. Vice versa, when there is a decline in world oil prices. The significance of this effect can be seen in the t-statistics for lags one, two and three, respectively [3.82366], [1.50494], and [0.32641]. The t-statistic at lag 1 is greater than the t-table at 5% alpha of 1.65159, while at lag 2 and 3, the t-statistic value is lower.

A similar effect also occurs in the gold price (GOLD) variable on the Jakarta Islamic Index (JII). The coefficient values in lags one, two and three are 0.033117, 0.027961 and 0.040366, respectively, proving that GOLD has a positive effect on JII changes. If there is an increase in the world gold price by one point, it will also increase JII by 0.033117 (on lag 1), 0.027961 (on lag 2) and 0.040366 (on lag 3). T-statistics at lags one, two and three are [1.2004], [1.00258], and [1.44442], respectively. These three values when compared with the t-table at 5% alpha of1.65159, it is smaller so that the effect is not significant.

Furthermore, on the Dow Jones Index (DJIA) variable, the coefficient value at lags one, two and three is 0.003873, 0.003929, and 0.003626. It can be proven that the DJIA variable has a positive effect on changes in JII. If there is an increase in the DJIA by one point, on the previous one, two and three days, it will push the JII to increase by 0.003873, 0.003929, and 0.003626, respectively. Likewise, if there is a decrease in the DJIA, it will decrease the JII value, according to the magnitude of the coefficient value for each lag. In addition, to determine the significance, it can be seen that the t-statistics at lags one, two

and three are [2.50657], [2.27803], and [2.30703]. These three values are greater than the t-table value at 5% alpha. It can be concluded that the effect of DJIA on JII, both at lag one, two and three, is significant.

For the rupiah exchange rate variable per USD (IDR), it has a different effect on JII, at lags one, two and three. At lag 1, it can be seen that the coefficient is -0.007990, which means that there is a negative effect of the IDR variable on JII. If the rupiah exchange rate per USD, one day earlier, has increased by one rupiah, it will encourage a decrease in JII, and vice versa if there is a decrease in the IDR variable. While in lag two and three the coefficients are 0.012495, and 0.022561, so that the effect of IDR on JII is positive. If there is an increase in IDR on the previous two days, it will increase today's JII by 0.012495, while an increase of one rupiah in the previous three days will increase JII by 0.022561, and vice versa if there is a decrease in the rupiah exchange rate against IDR. The t-statistic values at lags one, two, and three are [-1.06418], [1.57596] and [3.07393], respectively. At lags one and two, the t-statistic is smaller than the t-table, so the effect is not significant. Meanwhile, in lag three, the t-statistic value [3.07393] is greater than the t-table at 5% alpha (1.65159), thus proving that the effect of changes in IDR in the previous three days is significant.

Table 13.

Variable	Coefficient	T-stats
OIL(-1)	16.63908	[4.81926]
GOLD(-1)	0.181593	[0.93302]
DJIA(-1)	-0.081249	[-5.52036]
IDR(-1)	0.063722	[1.32309]

Estimation Results of the Long-Term VECM Model (Dependent Variable: JII)

Source: processed data

For the world oil price (OIL) variable, for lag one, the coefficient of 16,63908 and t-statistic [4.81926]. The coefficient of 16,63908 indicates that there is a positive effect of changes in world oil prices on the previous day on fluctuations in the Jakarta Islamic Index (JII). If the world oil price increases by 1 USD per barrel, it will increase JII by 16,63908 points. T-statistic shows the level of significance of the influence of the independent variable on the dependent. The OIL variable shows a t-statistic of [4.81926] which is greater than the t-table at 5% alpha, namely1.65159. So that in the long term changes in world oil prices will have a significant impact on JII changes in the stock market.

Long-term VECM output shows the GOLD variable obtaining a coefficient of 0.181593. These coefficients prove that the gold price on the previous day had a positive influence on JII today. The increase in the world gold price on the previous day by one USD per ounce will push the JII increase today by 0.181593. However, the output shows that in the long run the effect is not significant as indicated by the t-statistic value of [0.93302], smaller than the t-table.

The Dow Jones Industrial Average (DJIA) in the long run has a coefficient of -0.081249 and a t-statistic of [-5.52036]. Changes in the DJI variable will have a negative effect on JII. If there is an increase in DJIA on the previous day by one point, it will affect the decrease in JII by 0.081249 points. On the other hand, if the DJIA decreased by one point on the previous day, it would increase the JII by 0.081249. In the long term, the t-statistic on the DJIA variable has a significant effect. This can be proven by the t-statistic value of [-5.52036], which is greater than the t-table.

The rupiah exchange rate against the USD also has an influence on JII fluctuations. The coefficient value of 0.063722 proves that IDR has a positive effect on changes in JII. The depreciation of the rupiah against the USD by one rupiah on the previous day pushed the JII up by 0.063722. On the other hand, if there is an appreciation of the rupiah against the USD by one rupiah on the previous day, the JII will decrease by 0.063722. However, in the long term, the effect of the IDR variable on JII is not significant, because the t-statistic value of [1.32309] is smaller than the t-table value of1.65159.

Table 18.

Variable	Coefficient	T-stats
OIL(-1)	-212.9906	[-4.24025]
GOLD(-1)	-10.08395	[-2,92623]
DJIA(-1)	1.721485	[4.60486]
MYR(-1)	21221.93	[2.75843]

Estimation Results of the Long-Term VECM Model (Dependent Variable: FTSEMHS)

Source: processed data t-table (α: 5%) : 1.65148

For the world oil price (OIL) variable, for lag one, the coefficient of -212.9906 and t-statistic [-4.24025]. The coefficient of

-212.9906 indicates that there is a negative effect of changes in world oil prices on the previous day on fluctuations in the FTSE Bursa Malaysia Hijrah Syariah (FTSEMHS). If the world oil price increases by 1 USD per barrel, it will decrease FTSEMHS by 212.9906 points. T-statistic shows the level of significance of the influence of the independent variable on the dependent. The OIL variable shows a t-statistic of [-4.24025] which is greater than the t-table at 5% alpha, namely1.65148. So that in the long term changes in world oil prices will have a significant impact on changes in FTSEMHS in the stock market.

Long-term VECM output shows the GOLD variable obtaining a coefficient of -10,08395. This coefficient proves that the gold price on the previous day had a negative effect on FTSEMHS today. The increase in world gold prices that occurred one day earlier by one USD per ounce will push FTSEMHS down today by 10,08395. In addition, the VECM output proves that in the long run the effect is not significant as indicated by the t-statistic value of [-2.92623], which is greater than the t-table.

The Dow Jones Index (DJIA) in the long run has a coefficient of 1.721485 and a t-statistic [4.60486]. Changes in the DJI variable will have a negative effect on JII. If there is an increase in DJIA on the previous day by one point, it will affect the decrease in JII by 0.081249 points. On the other hand, if the DJIA decreased by one point on the previous day, it would increase the JII by 0.081249. In the long term, the t-statistic on the DJIA variable has a significant effect. This can be proven by the t-statistic value of [-5.52036], which is greater than the t-table.

The exchange rate of the Malaysian ringgit against the USD also has an influence on the FTSEMHS fluctuations. The coefficient value of 21221.93 proves that MYR has a positive effect on changes in FTSEMHS. The depreciation of the Malaysian ringgit against the USD by one ringgit on the previous day pushed the JII up by 2,1221.93. On the other hand, if there is an appreciation of the Malaysian ringgit of one ringgit on the previous day, the FTSEMHS will decrease by 21221.93. In the long term, the effect of the MYR variable on FTSEMHS is significant, because the t-statistic value of [2.75843] is greater than the t-table value of1.65148.

vi. Impulse Response Function (IRF) Analysis

Impulse Response Function (IRF) analysis is part of VECM which aims to see the response given by endogenous variables, in the event of a shock. In addition, IRF can also estimate how long a variable will experience a shock if there is a shock in another variable.

The IRF graph shows the response given by the dependent variable in the event of a shock in each variable. The horizontal axis describes the length of the period the dependent variable responds to shocks that occur in each variable. While the vertical axis is the standard deviation which symbolizes the magnitude of the response given due to shocks. If the graph is above the horizontal axis with a standard deviation of zero, then the response is positive, whereas if the graph is below that axis, it means that the response to the shock that occurs is negative.

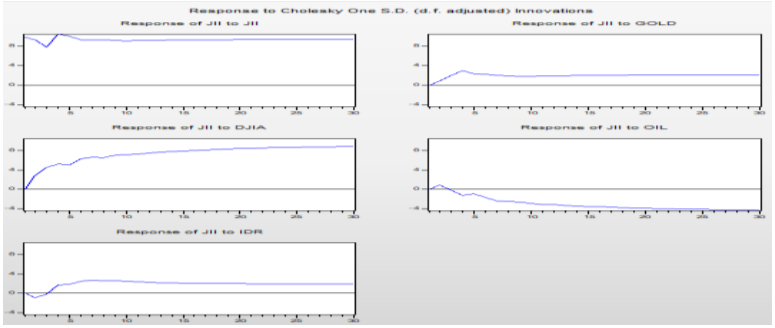

Figure 4.3 .
Impulse Response Function (IRF) with JII as Dependent variable variabel

Source: processed data

Figure 4.3 above shows the IRF output in the model with the JII variable as the dependent variable. The first graph shows the response of JII in the event of a shock to the variable itself. The position of the line that describes JII's response to shock which is on a horizontal line with a standard deviation of zero indicates that in general the response given is positive. The response to the shock that occurred in the JII variable fluctuated from period 1 to 10. The stability of the response given by the JII variable when a shock occurred in the variable itself began to be seen in the 11th period and reached a standard deviation of 9.360744 at the end of the 30 period.

The shock that occurs in the OIL variable tends to be responded negatively by the JII variable. The line that describes JII's response to the shock that occurs is below the horizontal line with a standard deviation of zero. In more detail, the responses that occur are fluctuating in periods 1 to 4. From period five onwards the responses tend to be more stable. At the end of period 30, obtained a standard deviation of -4.226205.

The graph showing JII's response to the shock that occurred in the gold price (GOLD) variable also tends to show a positive response. The line that represents the JII response is above the horizontal line with a standard deviation of zero. Response experienced instability in the period 1-10 and began to stabilize in period 11 until the end of the observation period. At the end of the observation (period 30) obtained a standard deviation of 2.154441.

The shock that occurs in the DJIA variable also tends to be responded positively by JII. It can be seen that the line that describes the response given by JII is above the horizontal line with a standard deviation of zero. In the period 1-8 the response given to the occurrence of shock in the DJIA fluctuated. The trend of a stable response can be seen from the 9th period. The standard deviation of 8.813364 was obtained at the end of the 30th period.

For the last independent variable, namely the exchange rate of the rupiah against the US Dollar, if a shock occurs in that variable, JII tends to respond positively. The line on the chart is above the horizontal line with zero standard deviation. It can be interpreted that in general, the shock that occurs is responded positively by the dependent variable. The response is fluctuating in periods 1-8, and starts to stabilize in period 9 and reaches a standard deviation of 1.906196 in the 30th period.

Cumulatively, the response given by JII to the shock that occurred in each variable, including the JII variable itself, can be seen in the figure below:

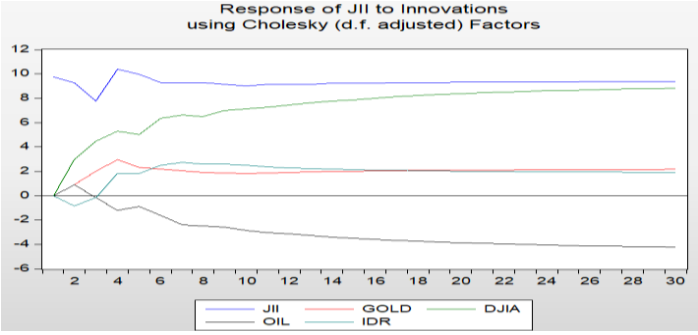

Figure 4.4.
Graph of Cumulative Impulse Response Function (IRF)
with JII as the dependent variable

Source: processed data

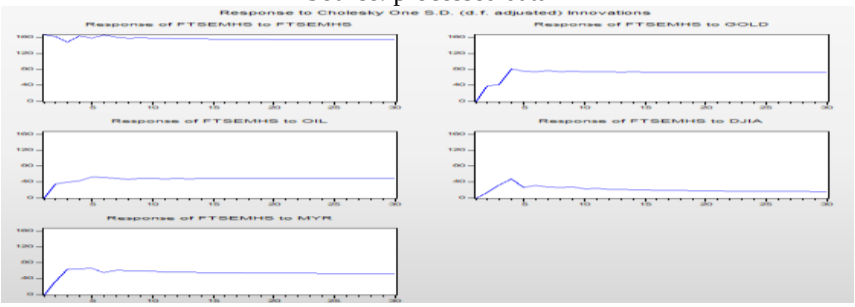

Figure 4.5.
Impulse Response Function (IRF) with FTSEMHS as the dependent variable

Impulse Response Function(IRF) that occurred in the FTSE Bursa Malaysia Hijrah Syariah Index, can be seen in Figure 4.5. Each graph describes the response of JII in the event of a shock to the independent variable or to the JII itself.

The first IRF test is carried out if there is a shock to the FTSEMHS variable and how is the response given by the variable itself. Based on the graph above, the responses given are generally positive. This can be seen from the line representing the response that is above the horizontal line with a standard deviation of zero. The response given to the shock that occurred fluctuated in periods 1 to 11 and began to stabilize from period 12. At the end of the 30th period the standard deviation reached 154.0510.

Furthermore, IRF is used to see the response when a shock occurs in the variable world oil price (OIL). The response given by the dependent variable on the shock that occurs is positive. In the graph, it can be seen that the line depicting the response from FTSEMHS is above the horizontal line with a standard deviation of zero. In the period 1-10 the response given when a shock occurs on the OIL variable is fluctuating. Stability is obtained from period 11 onwards. When it reaches period 30, the standard deviation formed is 48,81704.

The third IRF will see the response of the FTSEMHS variable in the event of a shock to the gold price variable (GOLD). In general, the response given is positive, supported by a line representing the rise and fall of the response above the horizontal line with a standard deviation of zero. In the period 1 to 9, the response to shock on the GOLD variable fluctuated. Entering a period of 10, the response shown is starting to experience stability. The standard deviation was formed at 72,91067 in period 30.

When shock occurs in the DJIA variable, the dependent variable in the form of FTSEMHS tends to give a positive response. This can be seen through the line that describes the response to shock which is above the line with a standard deviation of zero. The response given by the dependent variable on the shock that occurs has fluctuated in periods 1 to 16. The stability of the response can be seen from period 17 onwards. The end of the 30 standard deviation period was formed at 15.54952.

The last IRF analysis was carried out on the shock that occurred in the Malaysian ringgit per USD (MYR) exchange rate variable. Just like the response to shock that occurs in other variables, the shock that occurs tends to be responded positively. The graph shows that the line depicting the rise and fall of the response is above the horizontal line. Responses are fluctuating in periods 1 to 12. Entering period 13, the responses given tend to be stable. At the end of the 30th period, a standard deviation of 52,62731 was obtained.

Cumulatively, the response given by FTSEMHS to shocks that occurred in all independent variables as well as the FTSEMHS variable itself, can be seen in the image below.

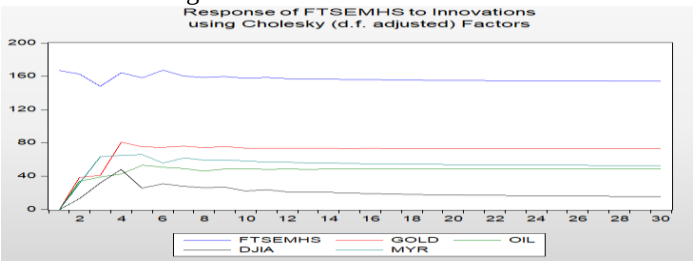

Figure 4.6.
Graph of Cumulative Impulse Response Function (IRF)
with FTSEMHS as the dependent variable.

Source: processed data

vii. Analysis of Variance Decomposition

Analysis of Variance Decomposition is used to observe the contribution given by each variable to the changes that occur in the variables studied, both dependent and independent. This analysis can be used to strengthen the IRF analysis that has been done previously. The results of the analysis of Variance Decomposition in the form of a percentage of the contribution given by each variable. Figure 4.7 below is the result of the variance decomposition test that occurs in the model with JII as the dependent variable, by observing in the period 1 to 30.

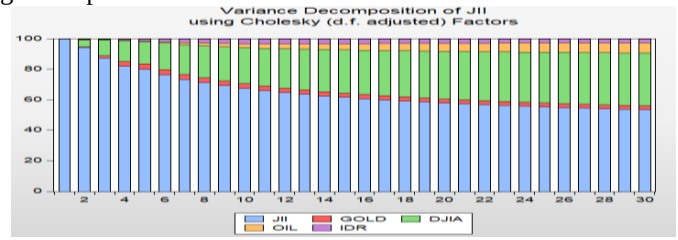

Figure 4.7.
Variance Decomposition Test Results (Dependent Variable: JII)

Source: processed data

Based on the picture above, the biggest contribution to the movement of the JII variable is the JII variable itself. At the beginning of the period, the JII variable has a 100% effect on the JII variable itself. Furthermore, in the second period and so on, the contribution of the JII variable continues to decline. At the end of period 30, it can be seen that the contribution of the JII variable itself is at 53.51897%.

The second largest contribution is given by the DJIA variable. The contribution given by the DJIA variable to JII begins in the second period of 4.480550%. Starting from the second period to period 30, it can be seen that the contribution of the DJIA variable tends to increase. In the second period the contribution given was 4.480550% and continued to increase until the 30th period. The contribution given at the end of the 30th period was 34.67623%.

The OIL variable gives the third largest contribution from the other variables. At the beginning of the second period, the contribution of world oil prices to JII was 0.409516% and experienced a positive trend (increasing). At the end of the 30 period the contribution given by the OIL variable became 6.697975%.

In the IDR variable, the contribution given to the JII variable in the period 1 to 30 also tends to have a positive tendency. In the second initial period, the contribution of the IDR variable was 0.378315%. The contribution given to JII continues to increase until in period 30, the contribution of the IDR variable to JII is 2,556738%.

The last variable that contributes to JII is the world gold price. At the beginning of the second period, GOLD contributed 0.408664% to JII. Contributions tend to decrease in subsequent periods. Until the end of period 30, the contribution made by the GOLD variable to JII is 2.550080%.

Figure 4.8 below is the output of the analysis of variance decomposition carried out on the FTSE Bursa Malaysia Hijrah Syariah. This analysis will look at the contribution of all variables, namely world oil prices (OIL), gold prices (GOLD), Dow Jones Index (DJIA), the Malaysian Ringgit exchange rate against the USD, and the FTSE Bursa Malaysia Hijrah Syariah Index variable itself.

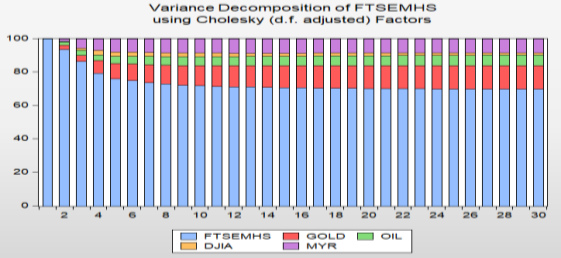

Figure 4.8.

REFERENCES

[1] Adiningtyas, DT [2018]. Analysis of the Effect of Inflation, Exchange Rate, World Crude Oil Prices and World Gold Prices on the Sharia Stock Price Index [Case Study in Indonesia and Malaysia]. 1–55. http://e-repository.perpus.iainsalatiga.ac.id/id/eprint/4661

[2] Alaoui Mdaghri, A., Raghibi, A., Thanh, CN, & Oubdi, L. [2020]. Stock market liquidity, the great lockdown and the COVID-19 global pandemic nexus in MENA countries. Review of Behavioral Finance. https://doi.org/10.1108/RBF-06-2020-0132

[3] Albulescu, CT [2020]. Coronavirus and oil price crash. ArXiv, 1–13. https://doi.org/10.2139/ssrn.3553452

Ali, M., Alam, N., & Rizvi, SAR [2020]. Coronavirus [COVID-19] — An epidemic or pandemic for financial markets. Journal of Behavioral and Experimental Finance, 27, 100341. https://doi.org/10.1016/j.jbef.2020.100341

[4] Antonio, MS, Hafidhoh, H., & Fauzi, H. [2013]. the Islamic Capital Market Volatility: a Comparative Study Between in Indonesia and Malaysia. Bulletin of Monetary Economics and Banking, 15[4], 391–415. https://doi.org/10.21098/bemp.v15i4.73

[5] Ardana, Y., & Maya, S. [2019]. Determination of Macroeconomic Fundamental Factors and International Sharia Stock Price Index against the Indonesian Sharia Stock Price Index. Horizon: Journal of Islamic Studies, 14[1], 1–15. https://doi.org/10.31603/cakrawala.v14i1.2622

[6] Beik, IS, & Wardhana, W. [2011]. The Relationship between Jakarta Islamic Index and Other Selected Markets : Evidence from Impulse Response Function THE RELATIONSHIP BETWEEN JAKARTA ISLAMIC INDEX AND OTHER SELECTED MARKETS : Ekonomi Magazine, August.

[7] Bekaert, G., Harvey, CR, & Lundblad, C. [2007]. Global Growth Opportunities and Market Integration. LXII[3]. http://onlinelibrary.wiley.com/doi/10.1111/j.1540-6261.2007.01231.x/pdf

[8] BNM. [2020a]. BNM Quarterly Bulletin 1.

BNM. [2020b]. BNM Quarterly Bulletin 2.

[9] Chia, RCJ, Liew, VK Sen, & Rowland, R. [2020]. Daily new COVID-19 cases, the movement control order, and Malaysian stock market. International Journal of Business and Society, 21[2], 553–568.

[10] Czech, K., Wielechowski, M., Kotyza, P., Benešová, I., & Laputková, A. [2020]. Shaking stability: COVID-19 impact on the Visegrad Group countries' financial markets. Sustainability [Switzerland], 12[15], 1–18. https://doi.org/10.3390/SU12156282

[11] Fogang, MM, & Ahmadi, N. [2020]. The Impact of a Pandemic [COVID-19] on the Stock Markets A Study on the Stock Markets of.

[12] G, EFS, Aisyah, N., Pulungan, F., & Subiyanto, B. [2021]. The Relationships between Abnormal Return , Trading Volume Activity and Trading Frequency Activity during the COVID-19 in Indonesia. 8[2], 737–745. https://doi.org/10.13106/jafeb.2021.vol8.no2.0737

[13] Goh, TS, Henry, H., & Albert, A. [2021]. Determinants and Prediction of the Stock Market during COVID-19: Evidence from Indonesia. Journal of Asian Finance, Economics and Business, 8[1], 001–006. https://doi.org/10.13106/jafeb.2021.vol8.no1.001

[14] IMF. [2020a]. World Economic Outlook [April Issue].

IMF. [2020b]. World Economic Outlook Update. In Imf [Issue 2].

IMF. [2021]. World Economic Outlook Update. In Imf [Issue 2].

[16] Indrastuti, DK [2021]. Impact of Confirmed , Death , and Recovered Cases of COVID-19 Toward Stock Exchange Composite Index. 10[1], 1–10.

[17] Iyke, BN [2020]. COVID-19: The reaction of US oil and gas producers to the pandemic. Energy RESEARCH LETTERS, 1, 1–7. https://doi.org/10.46557/001c.13912

[18] Kartikaningsih, D. [2020]. The Effect of Exchange Rates on Share Prices of Food and Beverage Sector Companies During the Covid-19 Pandemic BISMA: Journal of Business and Management, 14[2], 133. https://doi.org/10.19184/bisma.v14i2.17862

[19] Kennedy, PSJ, & Hayrani, R. [2018]. The Influence of Macroeconomic Factors: Inflation, Exchange Rate, Oil Prices, And Prices Of Building Materials On The Stock Prices Of Property Companies In Bei. Journal of Management Partners, 2[1], 1–12. https://doi.org/10.52160/ejmm.v2i1.31

[20] Kewal, SS [2012]. The Effect of Inflation, Interest Rates, Exchange Rates, and GDP Growth on the Composite Stock Price Index. Journal of Economia, 8[1], 53–64. https://doi.org/10.21831/economia.v8i1.801

[21] Khan, K., Zhao, H., Zhang, H., Yang, H., Shah, MH, & Jahanger, A. [2020]. The impact of the COVID-19 pandemic on stock markets: An empirical analysis of world major stock indices. Journal of Asian Finance, Economics and Business, 7[7], 463–474. https://doi.org/10.13106/jafeb.2020.vol7.no7.463

[22] Kurniawan, A. [2019]. The Influence of Dow Jones Islamic World Malaysia Index and Dow Jones Islamic Market Japan Index on Indonesian Sharia Stock Index. FINANSIA: Journal of Islamic Banking and Accounting, 2[01], 102. https://doi.org/10.32332/finansia.v2i01.1543

[23] Lee, KYM, Jais, M., & Chan, CW [2020]. Impact of covid-19: Evidence from the malaysian stock market. International Journal of Business and Society, 21[2], 607–628.

[24] Liew, VK Sen. [2020]. The effect of the novel coronavirus pandemic on tourism share prices. Journal of Tourism Futures. https://doi.org/10.1108/JTF-03-2020-0045

[25] Liu, H., Manzoor, A., Wang, C., Zhang, L., & Manzoor, Z. [2020]. The COVID-19 outbreak and affected countries stock markets response. International Journal of Environmental Research and Public Health, 17[8], 1–19. https://doi.org/10.3390/ijerph17082800

[26] Mulyadi, M. . [2012]. Volatility spillover in Indonesia, USA and Japan capital markets. African Journal of Business Management, 6[27]. https://doi.org/10.5897/ajbm11.2054

[27] Naifar, N. [2016]. Do global risk factors and macroeconomic conditions affect global Islamic index dynamics? A quantitative regression approach. Quarterly Review of Economics and Finance, 61, 29–39. https://doi.org/10.1016/j.qref.2015.10.004

[28] OECD. [2020]. COVID-19 and Global Capital Flows. OECD Report to G20 International Financial Architecture Working Group [Issue June]. http://www.oecd.org/investment/COVID19-and-global-capital-flows-OECD-Report-G20.pdf

[29] Rabhi, A. [2020]. Stock Market Vulnerability to the COVID-19 Pandemic: Evidence from Emerging Asian Stock Market. Journal of Advanced Studies in Finance, 11[2], 126. https://doi.org/10.14505//jasf.v11.2[22].06

[30] Robiyanto, & Aldhi, H. . [2018]. Contagion Effect and Capital Market Integration. Journal of Organization and Management, 14, Number[March], 1–9.

[31] Rosbi, S., & Haji-othman, Y. [2020]. Economic Recovery of post COVID-19 towards the Kuala Lumpur Composite Index [KLCI] and Malaysian Ringgit Exchange Rate. International Conference on Contemporary Issues in Islamic Finance [e-ICCIIF 2020], 2020[October], 40–52.

[32] Saad, NM, Mohamad, NEA, & Haniff, MN [2020]. Relationship between Share Price and COVID Cases among All Sectors in Main Market of Bursa Malaysia. Global Business & Management Research, 12[4], 455–465. https://search.ebscohost.com/login.aspx?direct=true&db=bth&AN=147933819&site=eds-live&custid=ns016423

[33] Salisu, AA, Raheem, ID, & Vo, XV [2021]. Assessing the safe haven property of the gold market during the COVID-19 pandemic. International Review of Financial Analysis, 74 [105353]. https://doi.org/10.1016/j.irfa.2021.101666

[34] Sharif, A., Aloui, C., & Yarovaya, L. [2020a]. COVID-19 pandemic, oil prices, stock market, geopolitical risk and policy uncertainty nexus in the US economy: Fresh evidence from the wavelet-based approach. International

Review of Financial Analysis, 70[April], 101496. https://doi.org/10.1016/j.irfa.2020.101496
[35] Sharif, A., Aloui, C., & Yarovaya, L. [2020b]. COVID-19 Pandemic, Oil Prices, Stock Market and Policy Uncertainty Nexus in the US Economy: Fresh Evidence from the Wavelet-Based Approach. SSRN Electronic Journal, May. https://doi.org/10.2139/ssrn.3574699
[36] Suganda, TR, & Soetrisno, Y. [2016]. Testing the Integration and Contagion Effects of Capital Markets in Five Asean Countries [Empirical Research After the Subprime Mortgage Crisis and the Greek Crisis]. Journal of Finance and Banking, 20[2], 252–262. https://doi.org/10.26905/jkdp.v20i2.358
[37] Sutanto, B., Murhadi, WR, & Ernawati, E. [2013]. Analysis of the Effect of Macroeconomics, the Dow Jones Index, and the Nikkei 225 Index on the Composite Stock Price Index [CSPI] on the IDX for the 2007-2011 period. University of Surabaya Student Scientific Journal, 2[1], 1–9.
[38] Syahri, A., & Robiyanto, R. [2020]. The correlation of gold, exchange rate, and stock market on the Covid-19 pandemic period. Journal of Finance and Banking, 24[3], 350–362. https://doi.org/10.26905/jkdp.v24i3.4621
[39] Tevfik Kartal, M., Depren, ., & Kılıç Depren, S. [2020]. The determinants of main stock exchange index changes in emerging countries: evidence from Turkey in COVID-19 pandemic age. Quantitative Finance and Economics, 4[4], 526–541. https://doi.org/10.3934/qfe.20200025
[40] Topcu, M., & Gulal, OS [2020]. The impact of COVID-19 on emerging stock markets. Finance Research Letters, 36, 101691. https://doi.org/10.1016/j.frl.2020.101691
[41] Widjanarko, H., & Utomo, HS [2020]. The Effect of Gold Prices and Interest Rates on Stock Performance [Study of Manufacturing Companies in Indonesia during the Covid-19 Pandemic]. 1[1], 112–117.
[42] World Bank. [2020a]. Global Economic Prospects: In Global Economic Prospects [Issue June]. https://doi.org/10.1596/978-1-4648-1553-9
[43] World Bank. [2020b]. Malaysia Economic Monitor June 2020: Surviving the Storm. June, 100. https://openknowledge.worldbank.org/handle/10986/33960
[44] Yousef, I., & Shehadeh, E. [2020]. The Impact of COVID-19 on Gold Price Volatility. International Journal of Economics and Business Administration, VIII[Issue 4], 353–364. https://doi.org/10.35808/ijeba/592