"Contagion and spillover effects of global financial markets on the Indonesian Sharia Stock Index post-COVID-19"

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CONTAGION AND SPILLOVER EFFECTS OF GLOBAL FINANCIAL MARKETS ON THE INDONESIAN SHARIA STOCK INDEX POST-COVID-19

Abstract

This study aims to examine the spillover and contagion effects of global financial markets on the Indonesian Sharia Stock Index (ISSI) post-COVID-19. The study uses the Vector Error Correction Model method to explore the short-term and long-term relationships between ISSI and global financial markets. The data used in this study are time series data, namely the ISSI and several other countries that have a significant influence on the global economy, which were observed from May to July 2022. The results of the study show that the USD has a positive influence on ISSI in the short and long term. At the same time, the JPY and HKD have a negative influence on ISSI. The GBP and SGD do not have a significant influence on ISSI developments. The economic, business and financial sectors began to adjust after the COVID-19 pandemic ended, including the Indonesian Sharia Stock Index. Contagion occurs from one country's financial system to another, which is influenced by aspects of volatility, exchange rates, the global crisis, the stock market, and stock indices. It is considered that this study can help the government to adjust better conditions of Islamic stocks in Indonesia.

Keywords	contagion, spillover, Islamic stock market, financial market
JEL Classification	G11, G12, F21, P18

INTRODUCTION

Globalization is a process that occurs in the economic dimension that can increase dependence and eliminate the distance between countries by making it a unified world economy (Panjaitan & Novel, 2021; Jufri et al., 2022). Globalization has also led to the merging of markets from various places so that they have become global markets or international markets, which are often used by a company to expand its market reach from domestic to globalized international areas (Miswanto & Aslan, 2020).

Similar to economic development, an economic crisis that occurs in a country can also have a major impact on the global economy (Febriandika et al., 2023). The resulting impact does not only cover the local area but also internationally (Hadi et al., 2022). Economic relations, including the increase and decrease in the economy of each country, greatly affect the economic stability of other countries. This is what is called the spillover effect that has occurred in the world, such as the outbreak of the COVID-19 outbreak (Wang & Han, 2021). Adnan (2022) and Ahmed et al. (2021) in their findings revealed that the COVID-19 case had a major impact on 12 Asian markets, which showed a significant negative effect based on the Average Abnormal

Return (AAR) and Cumulative Average Abnormal Return (CAAR) statistical data. The single factor ANOVA results also show that there is no variability between the 12 regional markets in the short term, and there is evidence that the main Asian stock market indices differ significantly compared to the FTSE All-World Index, which indicates spillover and cointegration impacts between the main Asian capital markets.

1. LITERATURE REVIEW

In the 1930s, the Great Depression occurred, which resulted in the worst financial crisis originating in the United States caused by the collapse of the US real estate market from 2007 to 2009. The impact of the crisis began to spread to almost all countries, including developing and developed ones. The crisis also caused a very sharp decline in the equity market, even bigger than the stock market in the United States itself (Gulzar et al., 2019).

From the crisis that occurred, this indicates that there is an interrelated relationship from one market to another, so this is what is called the contagion effect. This is in accordance with the theory presented by Pineda et al. (2022) in their research on contagion, namely cross-country contagion, which has identified that transmission channels can drive correlation dynamics when shocks occur in a country.

An economic shock in a country will also have an impact on the existing financial system throughout the world as a form of spillover effect (Sui et al., 2023). The impact of the contagion effect caused is the shifting of the system or market mechanism, which is currently happening a lot in the banking system. However, the positive impact is also not insignificant, starting from sources of financing that are cheaper, more flexible, wider, and can even provide benefits in its growth (Hu et al., 2023).

The development period of the capital market in Indonesia was also influenced by profitability and inflation factors, which also had an influential relationship with the Islamic stock index (Alvia et al., 2022). There is a COVID-19 pandemic that can disrupt health and cause instability in the country's economy and can even expand to a global scale, which has a very broad scope to countries all over the world (Nurabdi

et al., 2020). The COVID-19 outbreak has had many impacts, including on the stock market system, both conventional and sharia.

Wang dan Han (2021) proves that the spillover effect caused by the decline in the energy, economic and environmental sectors caused by the COVID-19 pandemic in the United States has had an impact on other countries. Most of the countries that experienced a decrease in the carbon emission index were due to the reduction in carbon emissions that occurred in the United States. This is the contagion effect that occurs in the stock market. Meanwhile, other studies have examined the relationship between Islamic stock indices in 10 countries and found that the movement of stock indices tends to be the same, and a long-term relationship has also been found (Abdullahi, 2021).

Panjaitan and Novel (2021) show that there is a contagion that occurs from the financial system of one country to another, which is influenced by aspects of volatility, exchange rates, global crises, stock markets, and stock indexes. The results arising from the contagion that occurs can cause spillover effects. The results of research conducted by Seďa and del Río (2021) confirmed that the spillover effect of volatility originating from the US stock market had a significant impact and was stated to have a greater effect compared to the period of the global financial crisis.

Based on previous research, there is a relationship between index returns in Indonesia (IHSG) and Thailand (SETI), which significantly influences each other with a confidence level of 95% (Adisetiawan & Ahmadi, 2018). In previous research, many have studied the spillover effect between conventional stock indices (Jufri et al., 2022), while there are still very few Islamic stock indices. Therefore, this study focuses more on examining the spillover effect between Islamic

stock indices globally and whether there is a contagion effect from this post-COVID-19 event.

Globalization is a phenomenon that occurs in the world. Globalization is considered the key to economic expansion for developing countries (Chambers & Dhongde, 2016; Stackhouse et al., 2019). Other studies also state that globalization can lead to increased dependence on capital markets (Baele, 2005; Chevallier et al., 2018; Vuong et al., 2022). In a study by Chambers and Dhongde (2016), globalization can cause conditions in countries to become similar, but in recent decades globalization has actually become the cause of increasing inequality in EU-27 countries (Asteriou et al., 2014). From 1970 to 2000, globalization also led to an increase in income inequality in OECD countries (Chambers & Dhongde, 2016). Some of the impacts arising from these cases cannot be separated from the contagion effect.

Contagion is an impact that involves a structural change in relation to equity. Contagion occurs when the correlation coefficient increases significantly during a crisis period (Forbes & Rigobon, 2002; Boubaker et al., 2016). In other studies, it is stated that contagion is the transmission of shocks within a country that spreads to other countries outside of fundamental relationships, which correlations occur during "calm periods" (Morales & Andreosso-O'Callaghan, 2014; Boubaker et al., 2016). In short, contagion is defined as "a disease that is highly contagious" (Forbes & Rigobon, 2002; Morales & Andreosso-O'Callaghan, 2014; Boubaker et al., 2016). Apart from contagion, there is also a relationship that is closely related to the economy, namely the spillover effect that arises when a crisis occurs.

Spillover is an external activity or economic process that affects endogenous variables that are not directly involved (Wahyuni et al., 2022). According to McMillan (2020), a spillover effect is something that can create a related movement between the capital market and other markets. The linkage is used as a source of information for investors to find out about market conditions and risks that may occur in the future.

McMillan (2020) also states that spillover is information from one market that can influence the development of other markets. The resulting impact can be in the form of predictive content that is given to be able to have an effect on the next asset price movement. The stronger the integration between countries, the stronger the resulting spillover effect, both caused by trade and financial relations (Panjaitan & Novel, 2021). The United States is listed as a country with a large capital market capitalization, while China is the only country with positive economic growth conditions during COVID-19. From these conditions, it can be concluded that good finance and economy can also have an effect on other countries.

Any shock that occurs in the US stock market will directly impact the spillover effect on Singapore (Lin, 2012; Morales & Andreosso-O'Callaghan, 2014). However, the Singaporean market is highly connected to the most developed market in the zone. Therefore, Singapore plays an important role as a propagation mechanism in the region. As a result, any shock originating from the US stock market will directly hit the Singaporean stock market, which then radiates throughout the Asian markets. This case shows that spillover effects, not contagion effects, affect regional markets stemming from the strong linkages that exist throughout the region, and Singapore is considered as the entry point. In this case, exchange rate fluctuations are considered to have a relationship with stock prices. The resulting spillover effect becomes stronger during the crisis period. These results can help in increasing the power of Asian market contagion analysis (Lin, 2012; Morales & Andreosso-O'Callaghan, 2014).

COVID-19 has an impact on global financial markets, which creates a very high level of uncertainty. This resulted in a significant decline in the stock and commodity markets and an increase in the flow of capital out of EMs, which could significantly reduce the performance of each country (Tiwari et al., 2022). El Hasanah and Panjawa (2016) revealed that during the monetary crisis period, the changes that occurred in the Jakarta Islamic Index (JII) were influenced by several factors, namely inflation, money supply, ex-

change rates, and interest rates. During the crisis that occurred in the 2006–2014 period, it has been proven that exchange rates are considered macroeconomic data that can represent the global financial system. The exchange rate is one of the important factors that is the driving variable in the development of JII.

The Islamic economy is developing quite quickly in Indonesia, which is undergoing numerous changes in its formulation of economic progress policies (Rizqi Febriandika et al., 2023). San Marino dan Rohanah (2021) shows that there was a significant difference between the JCI before and after the COVID-19 pandemic in Indonesia, as well as a decline in stock indices from various stakeholders in almost all parts of the world. The capital market in Indonesia had a negative reaction before being confirmed by the COVID-19 virus. This phenomenon also occurs in almost all capital markets around the world. This research shows that the JCI before COVID-19 in March-December 2019 tended to be stable, but starting in January 2020, there was a decline until it reached its lowest point in April 2022 (San Marino & Rohanah, 2021).

The sharia index has a higher movement than the JCI (Khajar et al., 2019; Alawiyah & Setiyaningsih, 2021). From these results, it can be seen that ISSI, even though in the midst of the COVID-19 shock, its share price has decreased but still has a strong performance in the capital market. Based on the theory and supporting research that has been described, the hypotheses that can be proposed include the following:

H1:   *The Contagion Effect of the Global Financial Markets has an influence on the Sharia Stock Index in Indonesia after COVID-19.*

H2:   *The Spillover Effect of the Global Financial Markets has an influence on the Sharia Stock Index in Indonesia after COVID-19.*

2. METHODS

This study uses quantitative methods with the aim of being able to examine the relationship between one variable and another variable (Febriandika,

2020; Alarcón et al., 2021; Vuong et al., 2022; Wang, 2023). The data used in this study are time series data, namely the Islamic stock index in Indonesia (ISSI) and several other countries that have a significant influence on the global economy, which were observed from May to July 2022. These data were obtained from www.idx.co.id and www.bi.go.id. The population used in this study is ISSI data and exchange rates from several countries.

The sampling technique used was purposive sampling with several criteria, namely an Islamic stock index and an individual country stock index (not combined or global). The information used by researchers to measure the stock index is the closing price of the stock on the previous day (Guliyev, 2022; Jufri et al., 2022). The data were then analyzed using the Vector Error Correction Model (VECM) method to determine the short and long-term asymmetrical effects of contagion and global financial market spillover effects on Islamic stock indices in Indonesia (Dai et al., 2022; Pineda et al., 2022; Mikulić et al., 2021).

VECM is used to analyze six variables to determine their impact in the long term and short term both between the independent and dependent variables in the time series data and to explore the responses and contributions of each variable used (Dai et al., 2022). This approach is carried out by ignoring these variables, which are integrated at degree one I (1) (Pesaran et al., 2001). The data used is daily data on exchange rates or exchange rates, as well as the Sharia Stock Index in Indonesia (ISSI) for the 2022 period. The data source is obtained through the official websites of Bank Indonesia and the Indonesia Stock Exchange.

Data on the Sharia Stock Index in Indonesia (ISSI) are index data that includes the total market value of all total Islamic shares listed on the Indonesia Stock Exchange in a certain period of time (Putri & Maksum, 2020). The ISSI data used are the daily ISSI from May to July 2022 obtained from the official website of the Indonesia Stock Exchange (IDX), namely www.idx.co.id. This study uses the specification Vector Error Correction Model (VECM) to explain the relationship between stock price variables and exchange rates from several countries. The ISSI cointegration estimation model is formulated through the following equation.

Equation (1) shows the cointegration model, while equation (2) shows the VECM model (Masrizal et al., 2021):

$$InISSI_t = \alpha_0 + \alpha_1 USD_t + \alpha_2 JPY_t + \\ + \alpha_3 HKD_t + \alpha_4 SGD_t + \alpha_5 GBP_t + \varepsilon_t, \quad (1)$$

$$\Delta ISSIi_t = \alpha_1 + \sum_\rho^{i=1} i\beta_{1i}\Delta ISSIi_{t-1} + \\ + \sum_\rho^{i=1} i\beta_{1i}\Delta USD_{t-i} + \sum_\rho^{i=1} i\beta_{1i}\Delta JPY_{t-i} + \\ + \sum_\rho^{i=1} i\beta_{1i}\Delta HKD_{t-i} + \sum_\rho^{i=1} i\beta_{1i}\Delta SGD_{t-1} + \\ + \sum_\rho^{i=1} i\beta_{1i}\Delta GBP_{t-i} + \varphi_1 ECT_{t-1} + \mu_{1i}, \quad (2)$$

where μ_{1i} = Random error; ECT_{t-1} = Vector integration; ϕ = Coefficient of adjustment for last year's imbalance; α = Speed setting coefficient regarding Long-term correction period; β = The coefficient of the individual variable $\in$ in error correction terms; ISSI = Indonesian Sharia Stock Index; USD = Exchange rate in the United States; JPY = Exchange rate in Japan; HKD = Exchange rate in Hong Kong; SGD = Exchange rate in Singapore; GBP = Exchange rate in England.

In this model, all variables must be endogenous, so the total equation must equal the number of each variable. Therefore, the dependent variable depends on the delay of the independent and dependent variables. ECM and the random error term are in each equation. Error correction indicates the speed of adjustment to be able to restore the balance of the model. The ECM coefficient indicates how fast the variable can return to its equilibrium. The ECM coefficient must be significant and negative (Masrizal et al., 2021; Wolde et al., 2022). For robustness purposes, it changes the index in equations (1) and (2) with another variable, namely the exchange rate, as shown in equations (3) and (4). Replacement is done to check the consistency of risk with changes in exchange rates from several countries. Equation (3) shows the cointegration for a robust model, and Equation (4) shows the VECM (Masrizal et al., 2021):

$$InISSI_t = \alpha_0 + \alpha_1 USD_t + \alpha_2 JPY_t + \\ + \alpha_3 HKD_t + \alpha_4 EXRT_t + \alpha_5 SGD_t + \\ + \alpha_6 GBP_t + \varepsilon_t, \quad (3)$$

$$\Delta ISSIi_t = \alpha_1 + \sum_\rho^{i=1} i\beta_{1i}\Delta ISSIi_{t-1} + \\ + \sum_\rho^{i=1} i\beta_{1i}\Delta USD_{t-i} + \sum_\rho^{i=1} i\beta_{1i}\Delta JPY_{t-i} + \\ + \sum_\rho^{i=1} i\beta_{1i}\Delta HKD_{t-i} + \sum_\rho^{i=1} i\beta_{1i}\Delta EXRT_{t-1} + \\ + \sum_\rho^{i=1} i\beta_{1i}\Delta SGD_{t-i} + \sum_\rho^{i=1} i\beta_{1i}\Delta GBP_{t-i} + \\ + \varphi_1 ECT_{t-1} + \mu_{1i}. \quad (4)$$

This study uses vector autoregression (VAR) analysis that combines the integration error correction model with the VECM method (McMillan, 2020). This study identified sequence integration for all variables by applying the Augmented Dickey-Fuller Test (ADF) (Oad et al., 2022) and the Unit Root Test introduced by Dickey (2005) and Fuller (1970). The cointegration test used is to determine the cointegration between variables (Widarjono et al., 2021). After detecting the cointegration relationship between variables, it is followed by determining the long-term and short-term dynamics, after which the relationships between variables are analyzed using VECM (Masrizal et al., 2021).

3. RESULTS

The first analysis that must be carried out in the stages of this method includes stationary tests, stability tests, and optimum lag tests. The stationary test aims to determine the stationary level of each variable using the ADF and PP (Philips-Perron) procedures (Bhardwaj & Duhoon, 2020). The results are presented in Table 1 that all variables are not stationary at the level. This is evidenced by the absence of significant cointegration at the level but stationary at the first difference level. Research with data that is not statistically stationary will produce a spurious regression, then the stationary

Table 1. Unit root test result

Variables	ADF test		PP test		Stationarity status
	Level	First difference	Level	First difference	
ISSI	−1.534213	−13.40298**	−2.471812	−12.82073**	I(1)
USD	−1.548932	−9.121569**	−1.250177	−9.169363**	I(1)
JPY	−1.728800	−8.699832**	−1.516349	−8.756059**	I(1)
HKD	−1.533928	−9.114153**	−1.246154	−9.159208**	I(1)
SGD	−2.394004	−9.603125**	−0.940591	−9.656608**	I(1)
GBP	−2.677920	−10.72021**	−2.732870	−10.76619**	I(1)

Notes: Lag lengths are selected based on the Schwarz Bayesian Criterion; the test statistics are compared with critical values from MacKinnon (1996). * Significance at 10%; ** significance at 5%; and *** significance at 1%.

test is continued to the first difference level and shows significant results as evidenced by the significant cointegration results (Guliyev, 2022; Masrizal et al., 2021).

The VAR and VECM models can be declared stable if all coefficients are less than one, and this is proven by the results of the root test presented in Table 1. The VAR stability test can be used to calculate the roots of a polynomial function as contained in Equations 1, 2, 3, and 4 (Masrizal et al., 2021). If the stationary modulus value is less than one and lies inside one circle, then the VAR/VECM model is considered valid. This can be seen in Table 2. Based on Table 2, it is proven that the modulus value is not more than one, so VAR/VECM can be used in this research.

Table 2. VAR stability test

Root	Modulus
−0.391119	0.391119
0.001289 − 0.245285i	0.245289
0.001289 + 0.245285i	0.245289
0.163700	0.163700
−0.154226	0.154226
−0.063566	0.063566

Based on Figure 1, the points contained in the image are in a circle, and nothing comes out of the circle line. Optimal lag results can also be determined to eliminate possible autocorrelation, which is shown in Table 3. Based on the calculations of the Akaike Information Criterion (AIC) (McMillan, 2020), the optimal lag results are at zero. This indicates that VAR/VECM can be used in this study.

Figure 1. Inverse root of AR characteristic polynomial

Table 3. Lag optimum test

Lag	AIC
0	44.89907*
1	45.02105
2	45.50591
3	45.56575
4	45.82045
5	45.81003
6	45.87512
7	45.73051
8	45.55833

Note: * Indicates lag optimal.

In VAR/VECM analysis, a cointegration test must be carried out to determine and ensure long-term cointegration using the Johansen Cointegration Test (Gulzar et al., 2019). If cointegration is found in the variables, then this study will continue to use the VECM method, but if the results do not contain cointegration, the method used is the VAR method. Cointegration results have been summarized and can be seen in Table 4.

Table 4. Cointegration test

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0,05 Critical Value	Prob.**
None*	0.530456	263.4287	95.75366	0.0000
At most 1	0.457834	196.1453	69.81889	0.0000
At most 2	0.379169	141.6610	47.85613	0.0000
At most 3	0.342666	99.23499	29.79707	0.0000
At most 4	0.310352	61.89387	15.49471	0.0000
At most 5	0.276650	28.82376	3.841466	0.0000

Note: Trace test indicates one (1) cointegrating equation at the 0.05 level.

The results show that there is long-term cointegration at the 5% confidence level with a statistical value higher than the critical value. This can be known based on the results of running data contained in Table 5, where there are USD, JPY, and HKD data so that the VECM model is applied in this study.

Table 5. Long-term cointegration

Variable	Coefficient	T-Statistic
LN USD (−1)	29.03757	3.27696***
LN JPY (−1)	−0.477975	−2.94201***
LN SGD (−1)	−0.115211	−0.18140
LN GBP (−1)	−0.074709	−0.27472
LN HKD (−1)	−26.76296	−3.00036***

Note: *** significant to ISSI.

VECM was applied to examine the short-term and long-term dynamics between variables and their relationships shown in Tables 5 and 6. Table 6 shows that there is a deviation, and it is corrected to −1.098342. This is a speed adjustment to return to the balanced value. VECM estimates show that HKD has a negative impact on ISSI, where an increase in HKD by one percent can reduce the ISSI value by −29.10979.

Table 6. Short-term effects

Variable	Coefficient	T-Statistic
CointEq1	−1.098342	−5.85819
D LN ISSI (−1, 2)	−0.063542	−0.51487
D LN USD (−1, 2)	30.48613	3.97578***
D LN JPY (−1, 2)	−0.180597	−1.14690***
D LN SGD (−1, 2)	0.112629	0.20026
D LN GBP (−1, 2)	−0.047297	−0.23069
D LN HKD (−1, 2)	−29.10979	−3.78157***

Note: *** significant to ISSI.

4. DISCUSSION

The results of the VECM model show that the USD has a significant positive effect on ISSI movements in the long term and is a relevant variable used to predict the performance of the Islamic stock market. This is evidenced by the data generated from Table 5, where the USD has a significant influence on the ISSI data. These results are consistent with those expressed by Gulzar et al. (2019). America was a source of influence on the fall of the US real estate market from 2007 to 2009. The results of other studies were also disclosed by Jufri et al. (2022), which revealed that the US sharia stock index had the effect of short-term asymmetry on the Indonesian sharia stock index.

Meanwhile, JPY shows results that have a significant negative effect on the movement of ISSI in the long term and is a variable that is quite relevant to be used to predict the performance of the Islamic stock market, especially in Indonesia at this time. This is because JPY is a variable that influences the contagion effect on indices from various countries, including Indonesia and Japan, which have a high intensity of transmission impact (Zorgati et al., 2019). However, Japan is included in the category that provides quite a low influence when compared to Hong Kong, which has a greater negative reaction compared to Japan, and the resulting contagion effect is more significant.

GBP and SGD have no spillover effect or contagion effect on ISSI. This can be seen based on the results of running data contained in Tables 5 and 6, where GBP and SGD do not have a significant effect on changes that occur in the ISSI value. Exchange rates from the UK and Singapore have no impact on the condition of Islamic stock indices in Indonesia or in other countries (Zorgati et al., 2019; Wong, 2022).

Higher exchange rates get a positive response as a reference in investing, especially in ISSI. This relationship is corroborated by the results of further studies by Jufri et al. (2022), Setiawan & Kartiasih (2021), Panjaitan & Novel (2021), and McMillan (2020), which found that a country's exchange rate significantly determines the contagion and spillover effect of the stock market (Nur Azizah et al., 2016).

Farid et al. (2022) show that there is a strong relationship between the Islamic capital market and real economic activity and exchange rates, so the development of the Islamic capital market is more directed at an increase in economic activity that occurs in a real way. Exchange rates have a significant influence and are proven to be able to better adapt to changes from disturbances caused by external crises (Masrizal et al., 2021). It can be concluded that although there are contagion and spillover effects on both conventional and sharia capital markets, the sharia capital market is more able to survive the crisis than conventional capital markets.

Aloui et al. (2021) retrieved data during COVID-19 and showed that the impact of contagion and spillover effects from stocks was not limited to ISSI alone, but the impact had spread to affect the flow of Islamic bonds. Therefore, it can be concluded that even though there is an influence on ISSI caused by global financial markets, the impact is not only on ISSI but is even more widespread to affect the flow of Islamic bonds and conventional stocks (H. Ahmed & Elsayed, 2019).

The global financial crisis that occurred around 2010 has proven to significantly affect the volatility of the Islamic as well as conventional stock markets (Aloui et al., 2021). However, the Islamic stock market proved to be more able to protect investors during the crisis in connection with the crisis that occurred from 2008 to 2009, which attacked the financial system throughout the country and caused the global financial crisis at that time. Wong (2022) revealed that the case study was influenced by the real exchange rate, causing contagion and a spillover effect on real stock prices. Based on the case study, it can be seen that the exchange rate has a significant influence on stock prices which then spreads to the realm of global finance.

Tian et al. (2022) conducted a study that examined the mechanism of connectivity in the "Carbon-Commodity-Finance" system in developing countries by applying the spillover index approach using the VAR estimation model. He revealed that (1) the pattern of an overflow of the entire system is systematic, especially economic policy, the certainty of which cannot be known; (2) the stock market is the main source of shock contagion in the system, with green bonds being the biggest recipient of the shock; (3) the carbon market is connected heterogeneously with commodity and financial markets, receiving shocks from the stock market, silver and copper, and transmitting shocks to the gold market, while interactions that occur across carbon markets are carried out either directly or indirectly through the energy market, foreign exchange rates, and green bonds; and (4) the investment risk of most of the markets in the system can be reduced by creating a portfolio related to other markets, except for green bonds, as they are not ideal as hedging tools. In this study, sharia stocks were not mentioned directly, but in reality, sharia stocks are included in the class of stocks that have a considerable influence on the carbon financial system.

Through a comparison of the literature written by Tian et al. (2022), non-energy factors, crude oil, and bond markets, in the long run, tend to be the main sources of carbon market risk during the economic recovery, while coal futures, stock indexes, and non-commodity indices energy have a potential role in hedging against carbon exposure during an EU economic recession due to the spillover of relatively stable and strong returns to the EUA.

Previous research on sharia stocks that has been extensively researched is the Jakarta Islamic Index (JII), as was done by Robiyanto et al. (2019)
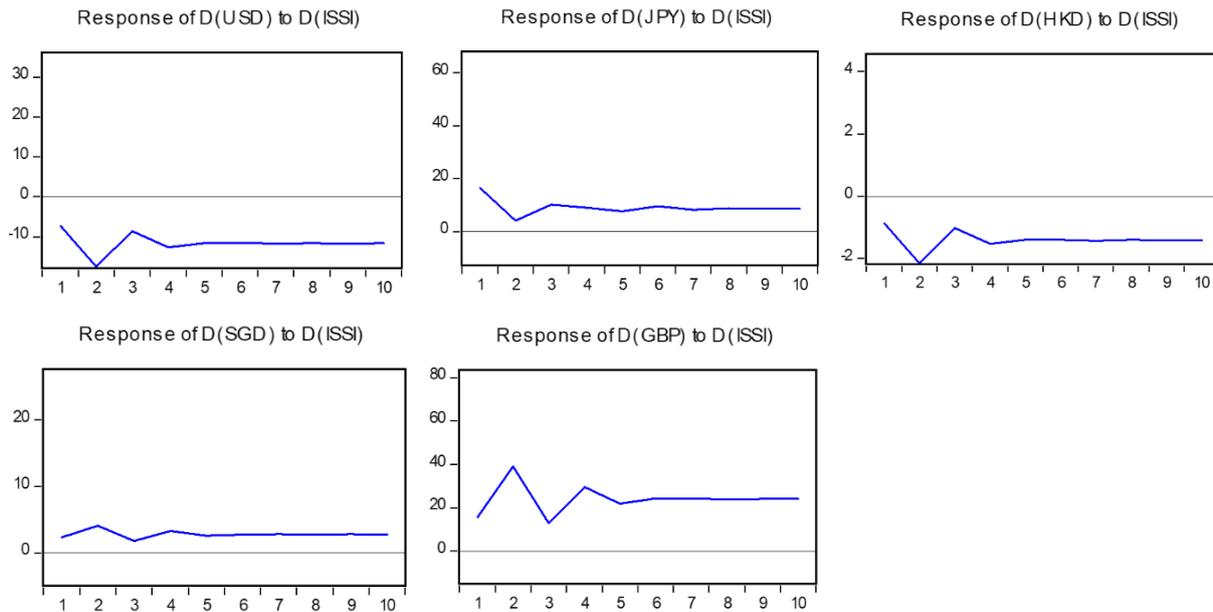
Figure 2. Respondent impulse function

and Oktaviani (2017). Robiyanto et al. (2019) revealed that involving gold in a portfolio of sharia stocks included in JII was able to improve the performance of the stock portfolio and was able to provide hedging effectiveness for sharia stocks by significantly reducing risk, but this strategy could not be used as a sharia-based investment strategy because Futures contracts are not considered as sharia compliance instruments and are haram in Islam.

Other research reveals that the Rupiah-USD exchange rate can distinguish the influence of the European, US, Japanese, and Malaysian Dow Jones Islamic Market relationship on JII (Oktaviani, 2017; Rahman, 2019). The IDR-USD exchange rate has an influence on the Islamic stock market, especially in Europe, the United States, Japan, and Malaysia, which then also affects Islamic stocks in Indonesia, namely JII. In this case, it is possible that not only JII will be affected, but it is also possible that all Islamic stocks will be affected as well, especially ISSI, which is one of the largest Islamic stocks in Indonesia. The findings by Ji et al. (2022) also revealed that the impact of the contagion effect occurred between the Chinese market and the US market, while for the Hong Kong stock market, it contributed to the resulting risk spillover. In this case, the exchange rate becomes an aspect that is quite important in the stock market, especially in its development and growth in the future.

The results of the USD variable impulse response function in Figure 2 show that the movement is stable and positive towards ISSI, while JPY, HKD, SGD, and GBP show adverse movements against ISSI at different times. It is known that at the beginning of the period up to the 4th period, the USD response was still very volatile (up and down). Furthermore, after the 4th period, the fluctuations began to decrease, meaning that the USD was no longer as volatile as in the previous period. In other words, the chart shows stability. The more the period increases, the USD's ability to influence ISSI also increases, while the SGD's ability to influence ISSI decreases.

Based on the results above, it can be seen that from period 1 to period 3, the USD experienced a sharp increase in influencing ISSI. After the 3rd period, the USD decreased in influencing the exchange rate, but not as strongly as in the 2nd period. Meanwhile, SGD shows that from period 1 to 4, it has decreased in influencing ISSI. There are five variables that contribute to ISSI, namely USD, JPY, HKD, SGD, and GBP. The USD variable is more capable of explaining ISSI compared to other variables. This is evident from the percentage of the USD variance decomposition to ISSI, which continued to increase until the 10th period, which had an influence of 15.13%, while SGD contributed only 17.68% to ISSI. In other words, USD has a bigger contribution to influencing ISSI compared to SGD and other variables.

CONCLUSION

This study explores the short-term and long-term relationship between ISSI and global financial market variables based on daily data from May 1, 2022 to July 31, 2022. In the short term, only the USD rate affects ISSI positively and significantly,–JPY and HKD negatively affect as well as significantly, while GBP and SGD have no significant effect on ISSI. The results of strong fluctuations occur in periods 1 to 4, where the USD variable has a strong contribution to the development and movement of ISSI. These results indicate that the exchange rates of these countries are proven to be able to influence the Islamic stock index in Indonesia. Countries that have strong influence include the United States, Japan, and Hong Kong. Exchange rates can indeed affect Islamic stock indices, especially ISSI, but it cannot be ruled out that conventional stock indices are also affected by spillover and contagion effects. Impulse response shows that ISSI responds positively to changes that occur in USD, HKD, and JPY rates, while ISSI responds negatively to GBP and SGD rates.

The risk of the United States USD exchange rate positively affects ISSI movement both in the long and short term, but the risk of the SGD exchange rate cannot affect it; but there is a possibility that it can be detrimental given the graph is close to zero. The impact of the spillover and contagion effects of these two variables has opposite directions. When the increase in the United States dollar exchange rate increases, the spillover and contagion effect from ISSI will improve, whereas when there is a change in the value of the Singapore currency, ISSI will be affected by a bad spillover and contagion effect. Therefore, the government must ascertain which countries have positive and negative influences, considering that this can affect the ups and downs of Islamic stocks in Indonesia.

Based on a risk perspective, a rational government must consider risk exposure and make policies for countries that can slow down the pace of the economy, especially in the global financial market system in periods 1 to 4, while in periods 5 to 10, it is predicted to be stable. In addition, the government should consider the risks that may occur in the future so that the stock market in Indonesia remains stable. Interest rates and exchange rates are macroeconomic variables that cannot be used as a consideration for investors in transacting on the stock market. Therefore, it is necessary to carry out further research related to the macroeconomic variables that influence the Islamic stock index in Indonesia, which may have a better influence in the future on the progress of the stock market in Indonesia and other countries.

AUTHOR CONTRIBUTIONS

Conceptualization: Nur Rizqi Febriandika, Yayuli, Maratul Awalliyah, Fifi Hakimi.
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