LEVERAGE EFFECT BETWEEN ISLAMIC STOCK AND SRI INDICES: CASE OF INDONESIA

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Abstract- This paper examines the difference in leverage effect between the Islamic stock index and the SRI index using the Indonesian data for a period before and during-after the COVID-19 pandemic. The interrelated issues of health and environment, starting from the COVID-19 pandemic, energy use, and environmental issues can have a different effects on different asset classes. With the distinctive feature of the Islamic stock index and SRI index, it can attract investors who want to diversify their portfolio to hedge against the health and environmental crisis. This study aims to examine the volatility risk in ISSI and SRI-Kehati as an impact of various events in 2020-2022. This paper attempts to test the leverage effect for a longer period incorporating the various major events in 2020-2022. This study uses daily price index data of ISSI and SRI-Kehati Index for the period 10/04/2013-28/11/2022 and employed the ARMA-EGARCH models to answer the objectives. The results show that there is a leverage effect in ISSI and SRI-Kehati for a period before and during-after the COVID-19 pandemic although the magnitude is lower after the during-after pandemic. The leverage effect indicates that the negative return that occurred in the constituents of both indices leads to higher volatility, implying that both indices are not prone to various events. The lower magnitude of the leverage effect on SRI-Kehati can give better assurance for investors regarding the volatility risk of the index.

Keywords: Islamic Stock Index; SRI Index; COVID-19; Crisis; Leverage Effect

1. INTRODUCTION

The past few years have shown various events affecting the economy as well as the financial market, starting from the COVID-19 pandemic at the end of 2019, the Russia-Ukraine war, and the issue of climate change. The first event that started with the health crisis affected the economy and financial condition as there was travel restriction that hampers the sectors that need people's mobility to generate their revenue. As the world is recovering from the COVID-19 pandemic due to the vaccination efforts, a war broke out between Russia and Ukraine which has impacted the commodity supply chain. With the European countries banning Russia from selling their gas supply, those countries have to seek other energy resources to keep the insulation for the households. As a result, there was a high demand for coal impacting an increase in coal prices. Another supply chain disruption is with the wheat commodity as both countries are two of the main exporters of wheat. On top of those two events, there has been an ongoing issue that becomes more important considering various other events that occurred during the last few years such as floods, wildfires, heatwaves, and many others. This climate change issue has been discussed widely among the regulator, industry, and even households, including the financial markets and their investors.

The various events have impacted different sectors, including the financial markets different ways, such as the decrease in stock market return during the early pandemic, the

disruption in the firms' operational activities affecting the investors' sentiment, and the urge implementation of ESG for the companies to accommodate the issue of climate change. However, there has been a discussion that there is a financial instrument that can stand previous crises, such as the global financial crisis of 2007-2008, namely *shari'ah* stocks. Several studies (*see:* Arouri *et al.,* 2013; Ashraf & Mohammad, 2014) have examined that *shari'ah* stock indices outperformed the conventional stock indices during the global financial crisis of 2007-2008. In addition, with the rising concern of environmental sustainability, another financial instrument that might get attention is the socially responsible investment (SRI) index. These two alternative indices are assumed to be taken as a safe-haven by the investors considering their past performance and the high concerns regarding environmental issues.

Figure 1. Price Movement of the Indices

However, the COVID-19 pandemic has affected the stock's performance in various industries and sectors. The stock index globally experienced a negative return of as much as -6.8% on March 2020, which then slowly went back within a week onward although it faced ups and downs the following period (see Figure 1). After almost two years of the pandemic, the invasion of Russia to Ukraine has impacted several sectors. The invasion led to a ban from the European Union (EU) for gas exported by Russia, as well as the disruption of wheat commodities exported to other countries that is the raw materials for various food ingredients. The ban from the EU has led to an increase in coal demand from European countries, of which Indonesia is one beneficiary considering that coal is one of the export commodities from Indonesia, resulting in a higher coal price (see Figure 2).

Figure 2. The Trend of Coal Price

On the other hand, the issue of climate change has increased the awareness of using renewable energy and deemed coal to be a "brown" investment. However, the EU ban on

Russian gas has led to higher demand for coal although climate change has been a central discussion.

As an investment alternative, Islamic stock indices and SRI can be affected differently compared to the general market. Islamic stock indices comprised stocks from firms that fulfill the *shari'ah* screening criteria, which are business screening and financial screening (Ghoul & Karam, 2007). The first is related to the types of business that the companies should not involve with alcohol, conventional financial institutions, production of pork meat, and other unlawful activities from Islamic perspectives. The latter is related to the financial screening criteria, such as the liquidity ratio, debt ratio, interest ratio, and non-halal income ratio. As for the SRI index, it also applies screening that is based on the ethical and environmental criteria to select their constituents.

This study aims to examine the effect of the COVID-19 pandemic, the increase in the coal price, and issues of climate change on the volatility of Islamic stock indices and SRI indices in Indonesia. As has been mentioned, the COVID-19 pandemic has impacted Indonesia quite severely, as shown by the economic growth experiencing negative growth of -2.1%. In addition, Indonesia has also benefitted from the increase in coal prices although the country has also been among the first issuer of green *Sukuk*, showing their support for climate change issues.

It is expected that the various events will have a different impact on the risk of different asset classes. As Islamic stock and SRI indices are comprised of more selected stocks, they might perform better, the same, or worse. With the increase in coal price, there is a possibility that investors will shift to coal mining companies instead of investing in the SRI index, to generate a higher return that is similar to the behavior in previous studies related to green bonds and their relation with commodity prices (*see:* Broadstock & Chevro, 2019; Kanamura, 2020; Kumar *et al.*, 2012; Managi & Okimoto, 2013; Reboredo & Ugolini, 2020). A study by Wijaya & Djajadikerta (2017) found that several factors, such as leverage, liquidity, and systemic, could affect the stock return. However, the effect can be different for different categories of stock, such as for the Islamic stock index, shown by a study by Gusni & Riantani (2017) who found that Jakarta Islamic Index (JII) was influenced by interest rate while inflation and exchange rate did not influence the index. Hence, this study will compare the volatility and existence of leverage effect on ISSI and SRI-KEHATI during the period observed using EGARCH. It aims to provide the latest examination on the difference performance of the Islamic stock index and the SRI index in a longer period that captures the period before the COVID-19 pandemic, during, and after the pandemic that experiences other major events.

This paper is structured as follows: section I explains the background and literature review of the study, section II explains the data and methodology used, section III discusses the results and analysis, and section IV concludes the overall study and findings.

1.2 Literature Review

Islamic finance has been emerging in the last four decades globally and three decades in Indonesia. The development of Islamic finance started in the 1960s with the establishment of *Mit Ghamr* in Egypt, followed by Dubai Islamic Bank as the first commercial bank in the 1970s along with the establishment of the Islamic Development Bank. This development was then spreading all across the globe and for various financial institutions, including the development of the Islamic stock market with the establishment of the Dow Jones Islamic Index. In Indonesia, the formal Islamic financial institution was the establishment of Bank Muamalat Indonesia in 1992, followed by the first Islamic mutual fund developed in 1997. In 2000, the regulator developed the Jakarta Islamic Index (JII), followed by the issuance of the first

corporate Sukuk in 2002. The shari'ah regulation for the Islamic capital market was established in 2003, followed by the regulation for the Islamic capital market in 2006, and the development of the Indonesia Sharia Stock Index (ISSI) in 2011.

The main distinction of Islamic finance compared to its counterpart is the prohibition of *riba*, *gharar*, and *maysir*. *Riba*, in general, means the additional obtained from lending money to other parties, while *gharar* means excessive uncertainty in the object itself or the contract (Visser, 2009). As for *maysir*, it means gambling or a zero-sum game. The prohibition leads to the regulation stipulated in the Islamic capital market regarding the companies that can be classified as *shari'ah* stocks, as well as the activities in the market that comply with Islamic principles. The regulation for companies to be categorized as *shari'ah* stocks is called *shari'ah* screening criteria, which consists of business screening and financial screening (Ghoul & Karam, 2007). The business screening or qualitative screening determines that companies are involved in interest-based financial activities, alcohol, production of pork meat and non-halal meat, pornography, tobacco, gambling, weapons, and several others. As for the financial or quantitative screening, the criteria depend on the index developing the criteria. The financial criteria are grouped into liquidity ratio, interest ratio, debt ratio, and non-permissible ratio (Derigs & Marzban, 2008). For example, the criteria determined by Dow Jones Islamic Market Index (DJIM) are 33%, 33%, and 33% for liquidity ratio, cash and short-term investment to total assets ratio, and debt ratio respectively. For Indonesia, the criteria are that the debt ratio should not exceed 45% and the non-halal income should be less than or equal to 10% (OJK, 2019).

The second alternative investment is the Socially Responsible Investment (SRI), which was developed based on religious reasoning that then evolves according to personal ethical and social beliefs (Renneboog *et al.,* 2008). The screening criteria are categorized into positive and negative criteria. On the positive one, it encourages investing in companies that have strong labor relations, involves in tackling climate change issues, and have community involvement. As for the negative screening, it motivates the investor to avoid investing in companies involved in fraud, marketing scandals, animal testing, human rights violation, alcohol, tobacco, gambling, interest-based financial institutions, and several others.

In Indonesia, there is a particular stock index that concerns the ESG (Environment, Social, and Governance) issues, namely Indeks SRI-KEHATI. This index is developed by KEHATI Foundation, launched in 2009, referring to United Nations' Principles for Responsible Investment (PRI). This index is jointly issued with the Indonesian Stock Exchange (IDX). To select its constituents, there are three steps conducted: (I) financial and liquidity aspects, (II) core business, and (III) ESG scores . In the first step, it will examine the market capitalization, total assets, net income, free float, and average trading value. In the next step, there is a negative list which are companies involved in pesticides, nuclear, weapons, tobacco, alcohol, pornography, gambling, genetically modified organism, and coal mining. As for the last step, the environmental score includes sustainability product and innovation, resources, energy usage, carbon emission, and waste management; the social score includes training and development for employees, the labor practice, health and safety workplace, product and client liability, and social impact; and governance score includes shareholders rights protection, competence and role of the board of commissioners and directors, information quality and transparency, business ethics, and sustainability management practice. Currently, there are 25 stocks included in the SRI-KEHATI Index.

Considering the features in the Islamic stock index and SRI index that consists of selected constituents as a result of the criteria as screeners, the impact of the COVID-19 pandemic and the energy crisis might be different. A study by Sherif (2020), who employed a shari'ah-

compliant UK Dow Jones market index for the period of 20th January to 20th of May, found that the COVID-19 pandemic does not have a significant relationship with the Islamic stock market. Further, the study segregates based on the sectors and found that information technology companies performed better than the market, while transportation, tourism and leisure, beverages, and consumer services had worse performance compared to the market. Utilizing different datasets, Setiawan et al. (2022) found that the pandemic hurts the stock market's performance in the G7 countries, that it has become riskier, and that the stock market in Muslim-majority countries s a convergence pattern. Aside from the effect of the COVID-19 pandemic, other previous studies have examined the performance of the Islamic stock market during the global financial crisis (Arouri *et al.,* 2013; Ashraf & Mohammad, 2014), who found that the Islamic stock market is less affected by the crisis. In addition, several studies have also found that the Islamic stock market outperformed the conventional (Elfakhani *et al.,* 2005; Hassan & Girard, 2011), while several other studies (Hussein, 2004; Hakim & Rashidian, 2004; Hoepner *et al.,* 2011; Albaity & Ahmad, 2011) found that Islamic equity does not have a significant difference compared to its counterpart.

As for the SRI Index, a study by Statman (2000, 2005) and Schroder (2003) found that SRI performed better than the general market, while a study by Statman (2000) and Renneboog et al. (2008) found that SRI Index did not have a significant difference from the counterpart. Along this finding, a study by Syed (2017) who examined the UK and France indices for the period of 2004-2009, found that SRI funds did not perform better or worse than the non-SRI funds. On different note, SRI stocks were found to have less risk than the conventional markets for the sampled countries of US, Europe, and the Asia-Pacific for the period of January 2004-December 2016 (Ameur *et al.,* 2020). In addition, a study by Brzeszczynski *et al.,* (2022) found that there is a decrease of the SRI companies' systemic risk during the COVID-19 pandemic. Comparing the SRI index and the Islamic stock index, the study by Erragragui *et al.,* (2018) found that Islamic stock index had lower systemic risk during the bearish period for the sampled countries. Further, the SRI index has higher alphas although it has a higher risk compared to the Islamic stock index.

2. RESEARCH METHODOLOGY

This study employs the daily price index of the Indonesian Sharia Stock Index (ISSI) and SRI-Kehati Index for the period 10th of April 2013 until 28th of November 2022, which is the data representing the Islamic stock index and SRI index respectively. The period is taken from 2013 as the earliest period of data available and it is assumed to have a stable period from the starting point of ISSI and SRI-KEHATI that was in 2011 and 2009 respectively, as well as to eliminate the effect of global financial crisis 2007-2008. The data is generated from Eikon Datastream, in which the price index series is transformed into return series for further data processing and analysis.

Considering the data to be a time series data and to capture the leverage effect that is the objective of this study, this study uses EGARCH (Exponential-Generalized Autoregressive Conditional Heteroskedasticity) model (Brooks, 2019) that will model the variance of the return series. To start the data processing and analysis, the daily stock price will be transformed into return series. The return series then should be ensured that they are stationary or there is no unit root in them, which can be checked using Augmented Dickey-Fuller (ADF) test. After ensuring the stationarity of the series, the mean equation is modeled with ARMA (Autoregressive Moving Average) models using the Box-Jenkins approach with steps of: (i) identify the lags by looking at the correlogram, (ii) estimation, and (iii) diagnostic checking.

Having the mean equation, the estimation's residual will be further observed for the existence of heteroskedasticity. If there exists heteroskedasticity, the residual will be modeled using the GARCH model. Having the GARCH model to estimate the variance, the extension of GARCH model, namely EGARCH model will be employed to examine the existence of the leverage effect in each series. Leverage effect is defined that negative return will lead to higher volatility of return compared to a positive return with the same magnitude of change.

Equations (1) and (2) present the general form of ARMA (1,1) and GARCH (1,1) respectively. Equation (1) shows that the return series (y_t) is modeled by one period lag of the return series itself (y_{t-1}) and one period lag of its residual (u_{t-1}). The number of lags can be different, which can be based on the correlogram figure explaining the significant series correlation of the return. Equation (2) shows that the variance of residual from the mean equation is modeled by one period lag of the variance itself (σ_{t-1}^2) and one period lag of the squared residual (u_{t-1}^2). Equation (3) shows the EGARCH equation, which models the residual in its logarithm form. The leverage effect from equation (3) is represented by the coefficient γ, having a negative value to show that there is a leverage effect. It implies that volatility and return have a negative relationship, indicating negative return has higher volatility compared to having positive return.

$$y_t = \mu + \phi y_{t-1} + \theta u_{t-1} + u_t \, , u_t \sim N(0, \sigma_t^2) \qquad (1)$$

$$\sigma_t^2 = \alpha_0 + \alpha_1 u_{t-1}^2 + \beta \sigma_{t-1}^2 \qquad (2)$$

$$\ln(\sigma_t^2) = \omega + \beta \ln(\sigma_{t-1}^2) + \gamma \frac{u_{t-1}}{\sqrt{\sigma_{t-1}^2}} + \alpha \left[\frac{|u_{t-1}|}{\sqrt{\sigma_{t-1}^2}} - \sqrt{\frac{2}{\pi}} \right] \qquad (3)$$

Following the EGARCH equation and the objectives of this study, it is expected that the coefficient γ is negative and significant for each ISSI and SRI-Kehati series.

3. RESULTS AND DISCUSSION

This section discusses the result and analysis of this study, starting with the descriptive statistics and unit root test for each series. The periods are divided into before and during-after the COVID-19 pandemic which are 15/04/2013-31/12/2019 for the former and 02/03/2020-28/11/2022 for the latter.

Table 1. Descriptive Statistics and Unit Root Test

	return_issi	return_srikehati
Before COVID-19 Pandemic: 15/04/2013-31/12/2019		
Mean	0.0000874	0.000243
Median	0.0000	0.0000
Maximum	0.0461	0.0586
Minimum	-0.0575	-0.0674
Std. Dev.	0.0096	0.0121
Observation	1754	1754
ADF (price index)	-1.9967	-1.2399
ADF (return)	-26.9232***	-40.5889***
During and after the COVID-19 Pandemic: 02/03/2020-28/11/2022		
Mean	0.00039	0.0000273
Median	0.00000	0.00000
Maximum	0.08693	0.14727
Minimum	-0.06558	-0.08188
Std. Dev.	0.011226	0.015422

	return_issi	*return_srikehati*
Observation	716	716
ADF (price index)	-0.8766	-1.0810
ADF (return)	-26.4825***	-26.2154***

Table 1 presents the descriptive statistics and unit root test for the return series of ISSI and SRI-KEHATI Index, divided into before and during/after the COVID-19 pandemic. The statistic shows that the mean return for SRI-Kehati Index is higher before the pandemic compared to ISSI, while it is lower during and after the pandemic compared to the ISSI. On the other hand, comparing each index before and after the pandemic, ISSI experienced an increase in the mean, while SRI-Kehati had a decrease. In terms of the standard deviation, the SRI-Kehati index has a higher value of standard deviation compared to the ISSI return in both periods.

As for the unit root test, it shows that both series are I(1) meaning that both are stationary in their first-differenced or their return form. Figure 3 presents the plot of return for ISSI and SRI-Kehati, alongside the IHSG (Jakarta Composite Index). It shows that during the full period, there is a big jump or volatility in early 2020, aligned with the announcement of COVID-19's first case in Indonesia.

To further examine the volatility of the ISSI and SRI-Kehati indices, ARMA-EGARCH models are performed and the result is shown in Table 2.
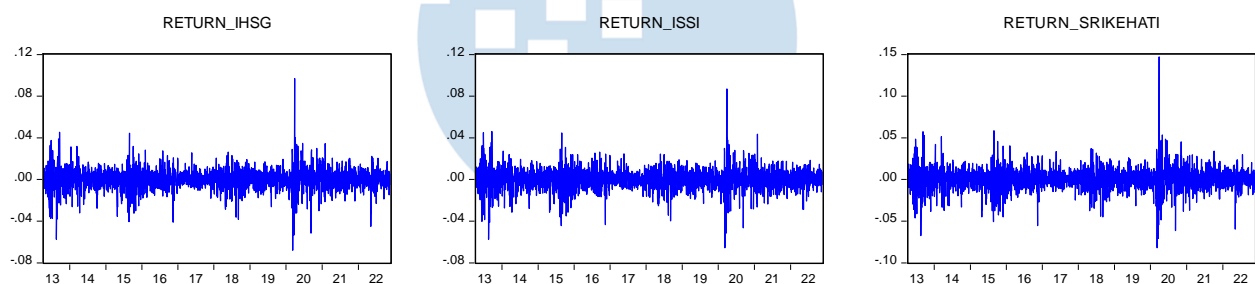

Figure 3. Return for the Indices

Table 2 presents the regression results for ARMA-EGARCH models for each return ISSI and SRI-Kehati, before and after the COVID-19 pandemic. The return of ISSI before and after the COVID-19 pandemic and the return SRI-Kehati after the COVID-19 pandemic has a mean equation of ARMA(3,3), while the return of SRI-Kehati before the COVID-19 pandemic has a mean equation of ARMA(2,2). For the variance equation, it employs the EGARCH models for the four columns. The coefficients γ show that there is a leverage effect in all four categories, indicating that a negative return leads to higher volatility. For return ISSI, the coefficient value is quite similar, which are -0.0578 and -0.0576 before and after the COVID-19 pandemic respectively. As for the return of SRI-Kehati, the leverage effect also exists before and after the COVID-19 pandemic. However, the coefficient value is lower during the COVID-19 pandemic. Comparing between return ISSI and return SRI-Kehati index, the coefficient value of the leverage effect is higher during the COVID-19 pandemic, meanwhile the coefficient values are similar to the results before the COVID-19 pandemic.

It can be inferred that ISSI's returns and SRI-Kehati have a leverage effect before and during the COVID-19 pandemic, and ISSI's returns relatively have a higher coefficient value of the leverage effect. It indicates that ISSI's returns have a higher risk compared to the returns of the SRI-Kehati index if there is a negative return occurring in the period. This low value of

the coefficient for leverage effect in SRI-Kehati can be due to the small number of constituents being included in the index, only 25 stocks. On the other hand, ISSI consists of around 300-400 stocks, showing a more diverse universe. Moreover, SRI-Kehati has additional criteria compared to ISSI resulting in more uniform constituents inside the index.

Table 2. ARMA-EGARCH Models (Regression Results)

Variable	*Before COVID-19 Pandemic*		*During and After COVID-19 Pandemic*	
	return_issi	*return_srikehati*	*return_issi*	*return_srikehati*
Mean Equation				
Constant	2.03E-05 (0.000177)	0.000264 (0.000204)	0.00031 (0.00034)	0.000289 (0.000463)
AR(1)	0.6904*** (0.0971)	1.0349*** (0.2229)	0.4069*** (0.0134)	1.2464*** (0.0138)
AR(3)	-0.4999*** (0.0807)	-0.3929** (0.1975)	-0.7555*** (0.0122)	-0.4577*** (0.01149)
MA(1)	-0.7081*** (0.1036)	-1.0179*** (0.2295)	-0.4212*** (0.0028)	-1.2796*** (0.0085)
MA(3)	0.4423*** (0.0889)	0.3090 (0.2098)	0.8060*** (0.0023)	0.5256*** (0.0082)
Variance Equation (EGARCH)				
Constant (ω)	-0.2458*** (0.0363)	-0.1594*** (0.0232)	-0.3362*** (0.0652)	-0.0537*** (0.0063)
β	0.1138*** (0.0155)	0.0740*** (0.0109)	0.1301*** (0.0196)	-0.0360*** (0.0083)
γ	-0.0578*** (0.0097)	-0.0519*** (0.0074)	-0.0576*** (0.0122)	-0.0172** (0.0077)
α	0.9831*** (0.0033)	0.9884*** (0.0021)	0.9749*** (0.0065)	0.9912*** (1.78E-05)
Adj. R-squared	0.0122	0.01476	0.02448	0.07623
Log Likelihood	5830.313	5423.435	2340.724	2152.352

Notes: *, **, *** indicates significant level at 10%, 5%, and 1% respectively. The mean equation for *return_srikehati* before COVID-19 pandemic is ARMA(2,2)

4. CONCLUSION AND LIMITATION

This study aims to examine the leverage effect of ISSI and SRI-Kehati indices, considering the effect of the COVID-19 pandemic and other issues during 2020-2022. The results from employing ARMA-EGARCH models present that there is a leverage effect for both ISSI and SRI-Kehati Indices for the period before and during-after the COVID-19 pandemic. It implies that a negative return leads to higher volatility for both indices. However, ISSI has a higher coefficient for the leverage effect indicating a higher effect of negative return on its volatility. One reason can be the number of constituents forming the indices in which SRI-Kehati only has 25 constituents making it more uniform, while ISSI has 300-400 constituents coming from more diverse sectors. Considering the result, it can be inferred that the SRI-Kehati index is less volatile and that the investors do not shift their investment dynamically due to the market condition and other more interesting assets in the market. On the other hand, ISSI seems to be more volatile compared to SRI-Kehati which can be a consideration for the regulator to stabilize the index.

This study is limited to the Indonesian case and only from two indices during the available period, which might not suitable for generalization. In addition, the longer period during-after the COVID-19 pandemic can already reflect the recovery period. To accommodate for the

limitation, further study can expand the sampled countries and use panel data to account for the direct effect of commodity prices on various related indices.

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