

Integration between Indonesian Sharia Stock Index and Türkiye Sharia Index Using the Generalized Autoregressive Conditional Heteroscedasticity Model

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Abstract. Indonesia and Türkiye are countries with a large number of followers of Islam. These two countries have a lot of cooperation in various activities. This study aims to measure the integration between Islamic capital markets in Indonesia and Türkiye. For the Indonesian Islamic capital market index, the Indonesian Islamic Stock Index (ISSI) is used, while for Türkiye, the Borsa Katilim (KATLM) is used. Using the Generalised Autoregressive Conditional Heteroscedasticity (GARCH) method, it was found that during the observation year, although there was a lot of cooperation, the activities of these two countries were not integrated. This can provide ideas for further research related to why there is a lot of cooperation between countries but it does not result in integration.

Key words: GARCH, integration, Islamic capital market, Islamic index.

Abstrak. Indonesia dan Türkiye merupakan negara dengan jumlah penganut agama Islam yang besar. Kedua negara ini memiliki banyak kerjasama dalam berbagai aktivitas. Penelitian ini bertujuan mengukur integrasi antara pasar modal syariah di Indonesia dan Türkiye. Untuk indeks pasar modal syariah Indonesia digunakan Indeks Saham Syariah Indonesia (ISSI) dan untuk negara Türkiye di gunakan Bursa Katilim (KATLM). Penelitian ini menggunakan harga penutupan saham syariah dari tahun 2017 – 2021. Menggunakan metode Generalized Autoregressive Conditional Heteroscedasticity (GARCH) ditemukan bahwa selama tahun pengamatan meski terjadi banyak kerjasama aktivitas kedua negara ini tidak terintegrasi. Hal ini dapat memberikan ide untuk penelitian lebih lanjut terkait mengapa ada banyak kerja sama antarnegara tetapi tidak menghasilkan integrasi.

Kata Kunci: GARCH, indeks Islam, integrasi, pasar modal Islam.

INTRODUCTION

According to published data, 86.9% from 237.53 million Indonesia's population is Muslim (World Population Review, 2024). In Türkiye, 99% of the population is Muslim (Harvard Divinity School, n.d.). In addition to the large number of people who adhere to Islam in both countries, these two countries also have Islamic banking and Islamic capital markets. Where Islamic banking provides encouragement to the Islamic capital market to optimise the existing market potential of Muslims (Soekapdjo, 2021).

In some countries the growth of the Islamic capital market is very fast. One of the markets that has a major contribution in encouraging the economic progress of a country is the capital market. In addition, the capital market is a bridge that connects investors and companies that want to develop their business, with the capital market expected investment activities can improve the economy and prosperity of society. According to Alam et al. (2017), the emergence of Islamic capital market

products has also promoted greater global financial integration. Among the existing financial instruments in the last decade, the most developed is the Islamic capital market. In addition, according Alam et al. (2013), to among the existing financial instruments in the last decade, the most developed is the Islamic capital market, then over the recent past years, the sukuk market has witnessed approximately 10%–15% growth rate to reach US\$ 170 billion outstanding portfolio at the end of 3rd quarter in 2011 (IIFM, 2011).

Furthermore, in Indonesia, there are several indices for Islamic stocks, including the Indonesia Islamic Stock Index (ISSI) which is a composite index for Islamic stocks. There is also the Jakarta Islamic Index (JII) which consists of 30 Islamic stocks that are included in the bluechip. While in Türkiye the main Islamic index is KATLM. Then there is the BIST 30 Index which is formed by measuring the collective performance of the shares of 30 companies traded on Borsa Istanbul with the highest market capitalization and trading volume. The trading code is XU030.

In 2020, research was conducted using the Turkish Dow Jones Islamic Capital Market indicator in the Asian region and Türkiye was ranked first with the largest Islamic stocks in Southwest Asia with a value of 7,230.17 in TRY (Sella et al., 2021). Türkiye and Indonesia have enormous potential for the development of Islamic capital markets. This has an impact on increasing corporate funds that can be used for production and employment, so that the existence of Islamic capital markets brings blessings to the government, the private sector and the community.

On the other hand, integration also occurs in global investment and finance. Integration in global equity markets plays an important role in international asset allocation and risk management. Furthermore, global equity market integration also tends to fluctuate in the short term due to market uncertainty and investor risk tolerance (Komatsubara et al., 2017). It is noted that international financial integration among industrialized countries developed gradually in the 1970s and 1980s and then accelerated in the mid-1990s (Lane and Milesi-Ferretti, 2017).

Furthermore, capital market integration is the linkage between capital markets around the world, due to the unrestricted access of investors, resulting in the achievement of international stock prices (Mailangkay et al., 2013). Capital market integration is an interesting topic for researchers in the field of capital markets, so it is not surprising that many studies on capital market integration have been conducted by several researchers (Majdoub et al., 2016; Subrahmanyam, 1975). An integrated Islamic stock exchange will lead to the emergence of inter-exchange relationships.

Therefore, many studies have been conducted previously on integration in the capital market. Several journals use the Indonesian and Turkish stock indexes, but none have specifically discussed the Indonesian sharia stock index (ISSI) and the Turkish sharia stock index (KATLM). The integration that occurs in the Islamic capital market between ISSI and KATLM will make the capital markets interrelated with each other and influence each other (closely correlated) in their changes (up and down) until the similarity of stock price movements on each exchange occurs simultaneously, resulting in the same risk and return which ultimately provides flexibility for investors to invest.

This study aims to see the extent of the integration that occurs between ISSI and KATLM during the Covid 19 pandemic (2017-2021). When the market is integrated, the close relationship between markets can strengthen economic cooperation between countries, especially if the capital market is sharia-based which shares the principles of justice and sustainability. To find the integration that occurs in this study, the Generalized Autoregressive Conditional Heteroscedasticity (GARCH) method is used.

LITERATURE REVIEW

Islamic Capital Market

Islamic capital market is a capital market that applies the principles of Islamic law in its business activities. Things that are prohibited in Islamic capital market activities are such as usury, gambling (*maysir*), and speculation (*gharar*). In addition, in the Islamic capital market, all instruments traded must comply with sharia standards. Furthermore, the institution that regulates sharia activities such as in the capital market is carried out by the Sharia Supervisory Board (DPS) under the auspices of the Financial Services Authority (OJK).

The Sharia Advisory Board (DPS) conducts qualitative and quantitative screening of sharia compliant companies. After that, it will be published so that investors can find out about companies that are included in sharia standards. The board collects company information from various sources, for example, company responses to survey forms, company annual financial reports and questions posed to the management of each company to determine the classification of the company as sharia compliant (Qizam et al., 2020). Then in Türkiye Islamic capital market is under department of Sermaye Piyasası Kurulu as Capital Markets Board of Türkiye.

Moreover, according to Kassim (2010), after the financial crisis occurred in 2008, there was an increase in the need for the Islamic capital market. Increased demand for open sharia capital markets has occurred in several developed countries, especially in Japan, England and America. Apart from that, developing countries such as Egypt, Malaysia and Sudan also have the same trend as developed countries regarding the need for sharia capital markets.

Capital Market Integration

Capital market integration is a situation where stock prices in various capital markets in the world have a very close relationship (closely correlated) between one capital market and other capital markets, so that capital markets in the world can achieve an international price (international pricing) for their shares and provide unlimited access or any barriers to investors around the world to own them (Mailangkay et al., 2013). The integration of stock exchanges will provide opportunities for companies to obtain capital efficiently, while for investors it provides an impact for them to invest in securities. Theoretically, a fully integrated international capital market (no barriers to owning securities in each capital market, and also no barriers to capital inflow/outflow) will create a lower cost of capital than if the capital market is not integrated (Husnan, 2005).

Several studies have analyzed the integration in Islamic stock markets with some methodologies (Kassim, 2010; Majdoub et al., 2016; Qizam et al., 2020). Kassim (2010) found that the global financial crisis that occurred from 2005 to 2010 had a significant impact on Islamic stock market integration. During the research period, it was reported that there was a consistent finding that the stock market was more integrated during the crisis period compared to the non-crisis period. In 2008, the demand for instruments in the Islamic capital market has increased especially in developing countries (Kassim, 2010). One of the reasons was that investors lost confidence in conventional capital markets after the financial crisis in 1997. Based on the research of Majdoub and Mansour (2014), there was risk diversification by looking at the weak correlation and the absence of shock transmission in Islamic financial markets in developing countries and also the US.

Several studies discuss about the impact of integration in capital market, for example the research of Orłowski (2020) found that deeper capital markets integration can have a positive impact on income and consumption smoothing across the EU (European Union) member countries.

METHOD

In this research we use sharia stock indices from two countries, namely Indonesia and Türkiye as research objects. For Indonesia, the Indonesian Sharia Stock Index (ISSI) is used and for Türkiye, the Türkiye Sharia Stock Index (KATLM) is used. The observation period used was 2017-2021 before Covid 19 occurred until after Covid 19 could be handled because the data available and published by investing.tr is only available in that period. The data used is monthly closing price data. The stock price index of each object uses its respective currency. Then this study was furnished based on secondary data.

After the data is collected, the data stationarity test will be carried out, if the data is stationary, it can be continued with the autocorrelation test, then the ARCH effect test. After that it will go into GARCH. However, if at the data stationarity test stage the data is declared non-stationary, the data will first be changed to the natural logarithm. The analysis that will be used is the analysis of Generalized Autoregressive Conditional Heteroscedasticity (GARCH) and as an analytical tool E-Views 13 was used to analyze time-series data.

Firstly, the ARCH(1) model, which is the simplest GARCH model and similar to an AR(1) model. Then we look at ARCH(p) models that are analogous to AR(p) models. Testing to find out the problem heteroscedasticity in time series developed by Engle known as test ARCH-LM. The main idea of this test is that residual variance is not just a function of independent variable but depends on squared residual of the previous period (Enders, 1995). This test is the same as the F statistic in generally to test $\alpha_i = 0$ ($i=1,2,\dots,p$) in linear regression.

$$\varepsilon_t^2 = \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \dots + \alpha_p \varepsilon_{t-p}^2 + w_t \dots \dots \dots (1)$$

where $t = m + 1, \dots, T$

w_t is error, m is an integer, and T is the sample size or number observation (Tsay, 2005). The ARCH-LM testing hypothesis is as follows :

$H_0 = \alpha_1 = \alpha_2 = \dots = \alpha_p = 0$ (there is no ARCH effect)

$H_1 = \alpha_1 \neq \alpha_2 = 1, 2, \dots, p$ (There is ARCH effect)

Level of significance = 0.05

Decision criteria:

H_0 is rejected if $F > X_p^2(\alpha)$ or $p - value < \alpha$ (Tsay, 2005)

Then finally, we look at GARCH (Generalized ARCH) models that model conditional variances much as the conditional expectation is modeled by an ARMA model. Furthermore, Generalized Autoregressive Conditional Heteroscedasticity (GARCH) is one of the econometric models introduced by Engle (1982) and developed by Bollerslev (1986). In its development the GARCH model become the mainstay for time series analysis on the capital market, which shows volatility estimator. This method approach is autoregressive because GARCH basically a time series model with an autoregressive form; and is called conditional heteroscedasticity because of the time variation in the conditional variance built on the model. From this model, integration will be created. According to Tsay (2005), $\varepsilon_t = X_t - \mu_t$, ε_t , he said to follow the GARCH model (p,q) if

$$\alpha_t^2 = \alpha_0 + \alpha_1 \varepsilon_t^2 + \alpha_2 \varepsilon_{t-2}^2 + \dots + \alpha_q \varepsilon_{t-q}^2 + Y_1 \sigma_{t-1}^2 + \dots + Y_p \sigma_{t-p}^2 = \sum_{i=1}^q \alpha_i \varepsilon_{t-i}^2 + \sum_{j=1}^p y_j \sigma_{t-j}^2 \dots (2)$$

RESULT AND DISCUSSION

From Figure 1, it can be seen that there are indications of stationary data. This can be seen from the Figure 1 which shows fluctuating movements (up and down) even though initially there was a quite significant or sharp decline at the beginning of 2020. Where in 2020 the world is experiencing Covid 19, this is could be the cause of a significant decline. The volatility error term shows a condition where volatility was quite high at the start of 2020 while other periods showed low volatility. So the next test is carried out, namely using a Correlogram. The Figure 2 are the results of data testing using Correlogram.



Source: Authors, 2024 (data processed).

Figure 1 The result of Indonesia Islamic Stock Index (ISSI) stationarity testing

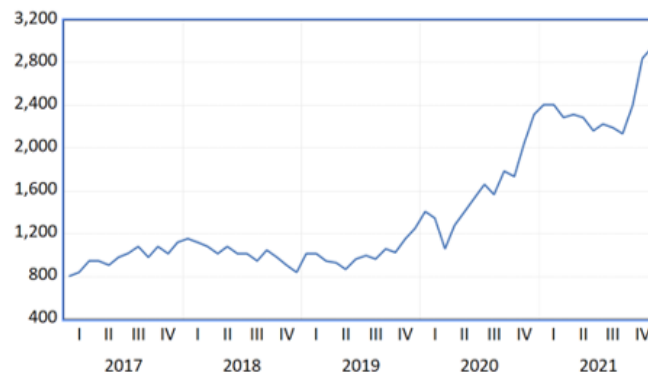
Date: 01/11/24 Time: 11:29
 Sample: 2017M01 2021M12
 Included observations: 60

| Autocorrelation | Partial Correlation | AC | PAC | Q-Stat | Prob |
|-----------------|---------------------|--------|--------|--------|------|
| 1 | 0.870 | 0.870 | 47.748 | 0.000 | |
| 2 | 0.710 | -0.197 | 80.035 | 0.000 | |
| 3 | 0.547 | -0.088 | 99.568 | 0.000 | |
| 4 | 0.432 | 0.100 | 111.98 | 0.000 | |
| 5 | 0.285 | -0.269 | 117.48 | 0.000 | |
| 6 | 0.200 | 0.212 | 120.24 | 0.000 | |
| 7 | 0.103 | -0.201 | 120.99 | 0.000 | |
| 8 | -0.003 | -0.175 | 120.99 | 0.000 | |
| 9 | -0.100 | 0.121 | 121.71 | 0.000 | |
| 10 | -0.125 | 0.041 | 122.88 | 0.000 | |
| 11 | -0.162 | -0.148 | 124.86 | 0.000 | |
| 12 | -0.202 | -0.025 | 128.02 | 0.000 | |

Source: Authors, 2024 (data processed).

Figure 2 The result of Indonesia Islamic Stock Index (ISSI) correlogram

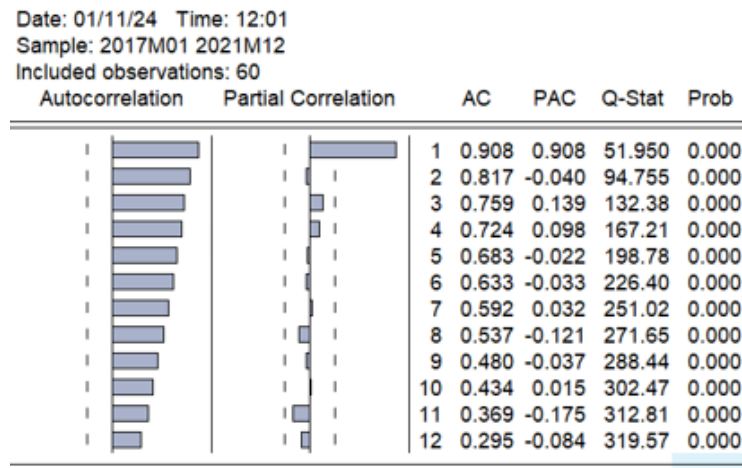
From the output results, it can be seen that below the lines there are lines that are out of bounds, meaning the data is not stationary. So it can be concluded that the ISSI model contains ARCH or GARCH elements. This means that H1 is accepted because there is an ARCH or GARCH effect.



Source: Authors, 2024 (data processed).

Figure 3 The result of Türkiye Sharia Stock Index (KATLM) stationarity testing

From these results it can be seen that there are indications of stationary data, this can be seen from the Figure 3 which shows fluctuating movements (up and down). This occurs because KATLM is a stock price index. In the world of capital markets, fluctuating conditions occur because the data is time series data where prices in a certain period are influenced by prices in the previous period. However, the trend looks different from ISSI, in 2020 the trend from KATLM has increased until 2021.



Source: Authors, 2024 (data processed).

Figure 4 The result of Türkiye Sharia Stock Index (KATLM) correlogram

Looking for the Relationship that Occurs Between ISSI and KATLM

This research was carried out using the E-Views 13 analysis tool. To see the regression that occurred between ISSI and KATLM, Ordinary Least Square (OLS) Linear Regression was used.

Table 1 The regression result of Indonesia Islamic Stock Index (ISSI) and Türkiye Sharia Stock Index (KATLM)

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|--------------------|-------------|------------------------|-------------|----------|
| KATLM | -0.000240 | 0.006848 | -0.035025 | 0.9722 |
| C | 724743.7 | 3780.089 | 191.7266 | 0.0000 |
| R-squared | 0.000021 | Mean dependent var | | 724621.4 |
| Adjusted R-squared | -0.017220 | S.D. dependent var | | 11140.48 |
| S.E. of regression | 11235.99 | Akaike info criterion | | 21.52440 |
| Sum squared resid | 7.23E+09 | Schwarz criterion | | 21.59421 |
| Log likelihood | -643.7319 | Hannan-Quinn criterion | | 21.55170 |
| F-statistic | 0.001227 | Durbin-Watson stat | | 2.018618 |
| Prob (F-statistic) | 0.972180 | | | |

Source: Authors, 2024 (data processed).

From the Table 1, it can be seen that the KATLM probability value is > 0.05 , which means that ISSI and KATLM do not have a significant influence. Therefore, this shows that the movement of prices or stock indexes between ISSI and KATLM in the market does not have a strong relationship or real impact between one and the other. Similar research related to integration was conducted by Majdoub et al. (2016), although using objects that were different from this study. Madjoub et al. (2016) found statistical results that the objects used had a significant influence, so the rate of return for each exchange was positive. However, in this study, the results were insignificant, so there was no influence and positive rate of return between the two indices.

The most prominent empirical findings in the study showed a low dynamic correlation when using the Islamic version of the MSCI index, which can be interpreted as weak integration. Therefore, the non-integration of objects in this study can be caused by differences in the basic principles of the two indices in Indonesia. ISSI is a stand-alone sharia stock index. Although regulated by the OJK, the fatwa used in the sharia capital market is issued by a separate department called the National Sharia Council - Indonesian Ulema Council (DSN-MUI). Meanwhile, the sharia stock index in Türkiye (KATLM) is still a participation index, and the Turkish capital market authority regulates its policies.

Granger Causality Testing

This test was carried out to see the relationship that occurred between ISSI and KATLM during the observation period 2017-2021. The results of the Granger causality test are as follows:

Table 2 Table of pairwise granger causality tests between Indonesia Islamic Stock Index (ISSI) and Türkiye Sharia Stock Index (KATLM)

| Sample: 2017M01 2021M12 | | | |
|-----------------------------------|-----|-------------|--------|
| Lags: 2 | | | |
| Null Hypothesis: | Obs | F-Statistic | Prob. |
| KATLM does not Granger Cause ISSI | 58 | 0.17186 | 0.8426 |
| ISSI does not Granger Cause KATLM | | 2.34432 | 0.1058 |

Source: Authors, 2024 (data processed).

From the results of the study, it can be said that both ISSI and KATLM during the observation period did not influence each other. Because they have no relationship with each other, it can be said that these two indices have weak integration and can even be said to be not integrated with each other. Referring to Zineldin (2002), an integrated economy has synergy, while in this study it is not integrated, meaning that ISSI and KATLM do not synergize in their activities.

However, in a study conducted by Qizam et al. (2020) using the sharia stock index from Indonesia, namely the Jakarta Islamic Index (JII) in ASEAN-5 countries, Indonesia and other countries are still very integrated even though the global financial crisis occurred in 2020, as well as in 2008 in his research, the capital market that was used as the object was greatly influenced by the indexes of other countries.

Not always the stock index that is not integrated considered negative. Because, for investors, the non-integration of several stock indexes in the capital market can be an opportunity for investment diversification. Investors will look for differences between several sharia stock indexes when diversifying investments.

CONCLUSION

This paper analyzes the integration relationship between ISSI and KATLM during the observation period 2017 - 2021. The latest year used is because the data published by investing.tr for KATLM is only up to 2021. During the observation period, there was no integration between the two indices. The two indices are not integrated, meaning that the market does not have a strong correlation between

KATLM and ISSI in terms of price movements, policies, or capital flows. This will make it difficult for the market to attract foreign investors. However, an unintegrated market can provide greater opportunities for portfolio diversification. Furthermore, this research can be expanded in various ways because the results found are not integrated so further research can find answers to what causes these two indices to not be integrated.

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