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SHARIA STOCK INDEX AND COMPOSITE INDEX IN INDONESIA: IS THERE ANY DYNAMIC RELATIONSHIP?

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Abstract

This research analyses the dynamic relationship between sharia stock exchange (ISSI) and macroeconomics condition then it would be compared to the relationship of the composite stock exchange (IDX Composite Stock). The method used in this study is Dynamic Conditional Correlation (DCC) analysis. Based on DCC method, it seems that macroeconomic variable have changing pattern of correlation relationship. This changeable pattern is not only on value scale but until its number sign. It indicated that macroeconomic variable has not any significant impact on sharia stock index (ISSI) and IDX composite index and vice versa.

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INTRODUCTION

In recent years sharia finance sector develops rapidly. Globally, the total asset of the sharia finance sector within three years increase significantly. At the end of 2012, the total assets have already reached US$ 1,6 trillion. At the end of 2013, the total assets of the sharia finance sector increase as much as 12,5 % become US$1,8 trillion. At the end of 2014, the total assets of this sector rewrite a significant increase as much as 16,67 percent become US$2,1 trillion. Moreover, it is estimated that at the end of 2020, the assets in the sharia finance sector will reach US$ 6,5 trillion (Hammaudeh et al., 2014).

Along with developing Islamic financial assets, research on the Islamic financial sector has also increased significantly, particularly research on the Islamic stock market. This is because the stock market, both conventional and Islamic, always has a unique and exciting phenomenon to study (Arief et al., 2020; Firdaus and Ika, 2019; Fermantiningrum, 2019). The Islamic stock market is uniquely different from the conventional stock market, as found in the research of Abdullah, Hasan, and Mohamad (2007); Hayat and Kraeussl (2011); and Makni, Benouda, and Delhoumi (2016), Dania and Malhotra (2013) explain that there are essential differences between the Islamic stock market and conventional markets.

According to Dania and Malhotra (2013), the decision-maker in the sharia stock market is not only rely on yield and risk (mean-variance), which maximizing profit, but refers to faith and religion's belief. Foglie and Panette (2020) conducted a literature review on Islamic stock index movement patterns with conventional stock index. They found that the research findings regarding the relationship between Islamic and conventional stocks have not reached a single agreement. However, research in several countries has found that Islamic stocks can be used as an allocation strategy in the capital market.

Trading stock in the sharia stock index must fulfill criteria and requirements based on Islamic theories (Hussain et al., 2016). At least there are two main differences between stock which is in sharia stock index and conventional stock, they are in terms of business activities and the second is based on the proportion of its capital. Based on the first distinction, the stock in the sharia stock index must not conduct any business activity prohibited by the Islamic rules. Some Islamic rules produce food or beverage containing alcohol, containing pork, producing guns to kill people, which is not permitted in Islam, business containing uncertainty/gambling, and business with usury (interest-based lending concept). Meanwhile, the second requirement is related to the level of capital and loan, which belongs to a company registered in the index stock exchange. The stock of a company categorized as sharia stock is capital or lending, which is not generated from usury sources (Narayan et al., 2016).

This unique characteristic makes this research about sharia stock attractive for some researchers. Some conventional financial concepts are used to comprehend some phenomena that occur in the sharia stock market, such as the usage of the CAPM concept in the sharia stock market (Abbes, 2012) and market efficiency (Hassan and Girrad, 2011). Meanwhile, Hussein (2007), Hayat (2006), and Hassan and Girrad (2011) analyzed the performance of stocks which is categorized as sharia stock.

This research would like to identify the dynamic relationship of sharia stock (IHSS), and macroeconomy conditions then compared it to the relationship between the index of the composite stock exchange (IHSG). This study still "borrows" the concept which was used in the conventional stock market. Even it used the concept of the conventional stock exchange market. Hopefully, this research will increase literature and insight into the development of sharia stock because, in principle, between sharia stock and the conventional one is the same. The method used in this research is Dynamic Conditional Correlation (DCC) analysis.

Some researchers have already conducted researches about the different characteristics. Some of them are Abdullah et al. (2007); Hayat and Kreaussl (2011); and Makni et al. (2016)., Abdullah et al. (2007) investigating the different performances between sharia stock and conventional stock in Malaysia. Hayat and Kraeussl tried to analyze the characteristics of sharia stock compared to conventional in terms of risk mean-variance and yield by using 145 samples generated from some countries.

Makni et al. also tried to analyze the different characteristics between sharia and conventional stock by involving a larger number than Hayat and Kraeussl and using data published by Eureka Hedge involving 1.130 active and inactive sharia stock and using the Dow Jones Islamic Market Index (DJIMI)

as a benchmark. Makni et al. found that from the 12 characteristics they investigated, seven characteristics influence sharia stock performance.

Ahmed (2019) examined the Islamic stock index's movement patterns and conventional stock indexes in the United States using the DCC model. He found that the movement patterns of the two indexes were opposite each other.

Nevertheless, research on the characteristics of sharia stocks has provided a whole picture that there is a significant difference between sharia stocks and conventional stocks. On this basis, several subsequent studies attempt to look at more specific phenomena, such as research conducted by Nature et al. (2016) and Narayan et al. (2016). Alam et al. tried to see the performance of the sharia stock index better than the conventional stock index. They tried to test the efficient market hypothesis on the sharia stock index. They found that the Sharia stock index has a weak form of an efficient market hypothesis. Meanwhile, Narayan et al. tried to predict return from sharia stocks by using 12 predictors.

Another study aimed to assess the performance of sharia stocks is a study conducted by Abdullah, Hasan, and Mohamad (2007) conducted in the Malaysian stock market. Their research found that stocks that entered into the Sharia stock index performed better when the market experienced a downward trend. Research on Sharia stocks' comparative performance with conventional stocks is also done by Alam et al. (2016). Alam et al. concluded that the performance of sharia and conventional stock indices are the same (it has no difference).

However, the comparison of dynamic relationships between sharia stocks and conventional shares with macroeconomic conditions in Indonesia has not been discussed. Most of the researchers have looked more at the dynamic relationship between Sharia and conventional stocks, such as research from Endri (2009), Hammaudeh (2014), and Dania and Malhotra (2013). Therefore, research comparing a dynamic relationship between Sharia and the composite stock with the macroeconomic conditions becomes interesting research to conduct.

METHOD

This study uses the Indonesian Sharia Stock Index (ISSI) and Indonesia Stock Exchange Composite (IDX Composite /IHSG) issued by Indonesia Stock Exchange (IDX). Data used is monthly data from March 2013 until October 2016. From March 2013 to October 2016, taken as the year of observation due to availability of all data used ISSI, JCI, IPI monthly, monthly inflation, monthly rupiah exchange rate, and monthly reference rate. Monthly reference rate data changed from July 2016 from BI Rate to BI 7 Day Repo Rate.

This study uses six variables, such as ISSI variables, IHSG, and macroeconomic variables. This study's macroeconomic variables are four indicators, namely Industrial Production Index (IPI), inflation rate, rupiah exchange rate against US dollar, and interest rate. The IPI variable is used as the proxy variable of the economic growth variable. Economic growth variables are available in quarterly data form, whereas in this study, the monthly data is used. The closest and most used proxies in various

studies for economic growth are the IPI variables. Within the study period, the reference interest rate variable was changed in July 2016, the interest rate used was Central Bank of Indonesia rate (BI Rate) changed to BI 7 Day Repo Rate. ISSI and JCI variables are taken from the publication of Yahoo Finance, IPI variable, and inflation rate taken from the Central Bureau of Statistics (BPS). Simultaneously, the variable of the exchange rate and the reference rate is taken from the publication of Bank Indonesia (BI).

The dynamic relationship between sharia and conventional stocks will be estimated using the DCC Model developed by Engle (2002). This method is part of Multivariate GARCH method. This method explains the effect of heteroscedasticity directly so that it can view the change of correlation quantity within the observation period. The general model used is Multivariate GARCH (1,1) which can be denoted as follows:

$$y_t = \gamma_0 + \gamma_1 y_{t-1} + \varepsilon_t \quad (1)$$

$$y_t = \left(y_{1,t}, y_{2,t}, \dots, y_{n,t}\right)'; \varepsilon_t = \left(\varepsilon_{1,t}, \varepsilon_{2,t}, \dots \varepsilon_{n,t}\right)' \quad (2)$$

$$h_{ii,t} = c_i + a_i h_{ii,t-1} + b_i \varepsilon_{i,t-1}^2 \quad (3)$$

$$\varepsilon_t | J_{t-1} \sim N(0, H_t); \quad (4)$$

Where y_t is the volatility index vector at time t, and J_{t-1} is the information available at time t-1. Meanwhile, conditional variance-covariance H_t can be denoted in the form of matrix below:

$$H_t = D_t R_t D_t \quad (5)$$

$$H_t = \begin{bmatrix} \sigma_1^2 & \sigma_{1,2} & \dots & \sigma_{1,n} \\ \sigma_{1,2} & \sigma_2^2 & \dots & \sigma_{2,n} \\ \dots & \dots & \dots & \dots \\ \sigma_{1,n} & \sigma_{2,n} & \dots & \sigma_n^2 \end{bmatrix} \quad (6)$$

Where:

D_t = n x n diagonal matrix of *time-varying* standard deviation from univariate GARCH model from the first diagonal

R_t = n x n diagonal *time-varying correlation matrix*

Correlation changes in DCC model can be written as equation below:

$$Q_t = (1 - \alpha - \beta)\bar{Q} + \alpha u_{t-1} u_{t-1} + \beta Q_{t-1} \quad (7)$$

$$R_T = \left(diag(Q_t)\right)^{-1/2} . Q_t . \left(diag(Q_t)\right)^{-1/2} \quad (8)$$

$Q_t = \left(q_{ij,t}\right)$: n x n time-varying covariance matrix from u_t (9)

$\bar{Q} = E[u_{t-1} u_t]$: n x n unconditional covariance matrix from u_t (10)

$$\alpha - \beta < 1 \quad (11)$$

Where $\left(diag(Q_t)\right)^{-1/2} = diag\left(1/\sqrt{q_{11,t,}} \dots, 1/\sqrt{q_{nn,t}}\right)$

In estimating DCC, Engle did it in two stages. The first stage is to use the univariate variance model to obtain volatility and calculate. In the second stage, the residual obtained from the volatility in the first stage is divided by the standard deviation from the first stage. The equation becomes where $u_{i,t}$,

then used to calculate the parameters of the conditional variance.

DCC model can be calculated by using log-likehood function. If θ denotes the parameter D_t, and φ denotes R_t parameter, then the log-likehood function can be written as follows:

$$L_t(\theta, \emptyset) = \left[-\frac{1}{2}\sum_{t=1}^{T}(n\ log(2\pi) + log|D_t| + \varepsilon_t{'}D_t^{-2}\varepsilon)\right] + \left[-\frac{1}{2}\sum_{t=1}^{T}(log|R_t| + u_t{'}D_t^2u_t - u_t{'}u_t)\right] \quad (12)$$

RESULTS AND DISCUSSION

There are six research variables used in this research such as: ISSI, IHSG (IDX Composite), IPI, inflation rate, exchange rate, and interest rate with 44 points of observation. Indonesia Sharia Stock Index has an average value of 654.37 with a minimum value of 556.09 and a maximum value of 746.87. Whereas the standard deviation of the variable of ISSI is 49.30.

Table 1: Descriptive Statistics of Research Variables

	N	Minimum	Maximum	Mean	Std. Deviation
ISSI	44	556.0900	746.8700	654.377271	49.3083962
IHSG	44	4194.9646	5518.5113	4863.863957	360.7587797
IPI	44	112.5800	136.3009	123.090780	6.4709762
Inflation	44	-.4500	3.2900	.451136	.6917125
Exchange Rate	44	9719	14657	12375.68	1240.625
Reference Rate	44	.0475	.0775	.070057	.0082386

Source: various sources

In the initial period of observation, the ISSI was at 660.34. During the observation timeframe, the trend of ISSI movement was relatively stable in the range of 556 to 746 with a standard deviation of 49.31. At the beginning of 2015 the value of ISSI had penetrated the number 700 but then fell back to reach its lowest point in September 2015.By the end of 2015 the ISSI value again increased. Until the end of 2016 ISSI value is relatively stable in the 700s.

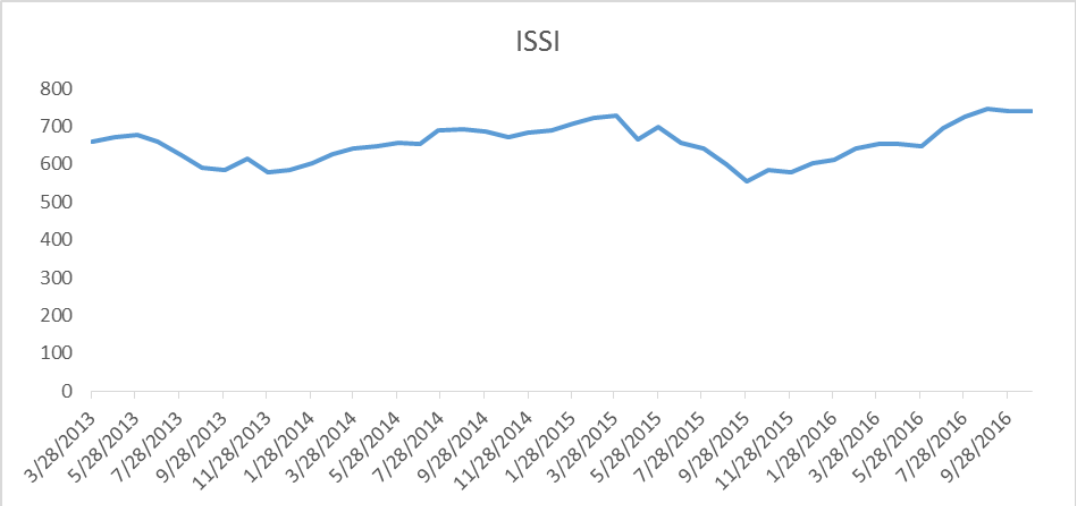

Figure 1. Movement Trend of ISSI Index
Source : Yahoo Finance

During the observation period, the IDX Composite has a range of 4,194.96 to 5,518.51 with an average of 4,863.86. JCI index has a much greater volatility than ISSI is 360.75. This volatility is seen more clearly in Figure 2. In the initial period of observation JCI is at the level of 4,740.83 and at the end of observation period JCI closed at the level of 5,423.54.

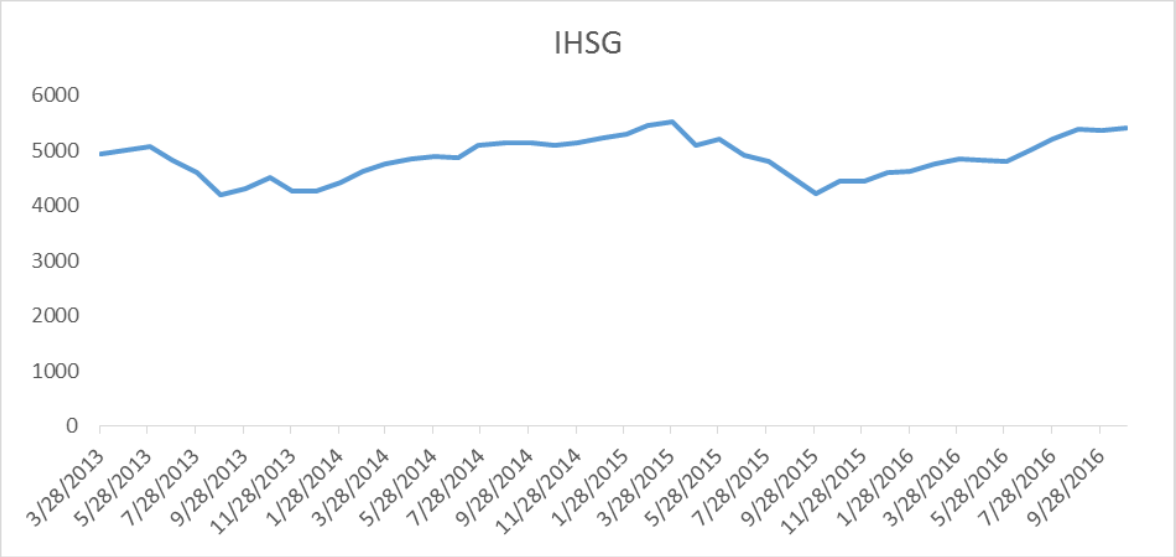

Figure 2. Movement trend of IDX Composite Index
Source: Yahoo Finance

Industrial Production Index which became proxy for economic growth variable experienced a trend that also increase. IPI value of drinking occurred in March of 2013. While the largest IPI occurred in June 2016 which reached 136.30. This IPI number indicates a positive sentiment from the industrial world with increasing production. This production increase will certainly encourage economic growth. Increased production will encourage job creation and increase people's incomes. Increase in revenues will encourage public consumption so that directly will increase economic growth. Consumption side has been the most important factor in the Indonesian economic system since more than 50 percent of economic growth is contributed by public consumption.

However, in addition to encouraging public consumption, an increase in production will also encourage the investment side. The escalation of production is usually accompanied by increasing production factors such as tools and technology, place of production activities, and other factors of production directly related to the company's investment. Increased investment will encourage and promote economic growth. Therefore, it is appropriate that IPI become a proxy variable for economic growth.

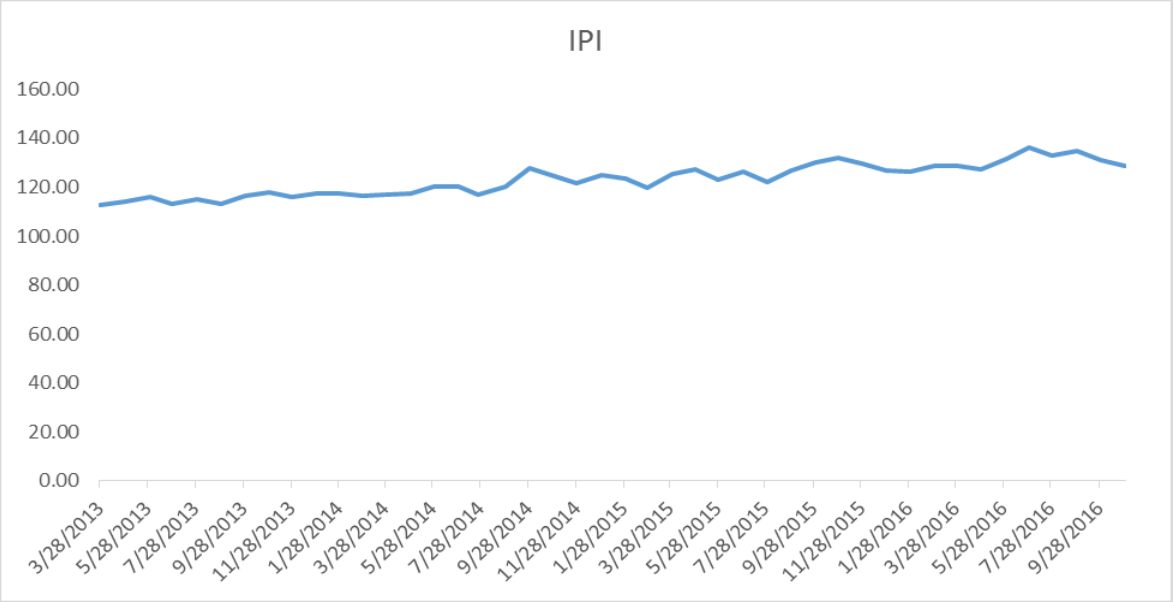

Figure 3. IPI Trend
Source: Central Bureau of Statistics, 2017

The next variable is the inflation rate. This rate of inflation is one of the most important indicators of macroeconomic health because it is directly related to the production, investment and welfare aspects of the community. During the observation period, Indonesia is more likely to experience inflation than deflation. The largest monthly inflation occurred in July 2013, which reached 3.29. While the smallest inflation (deflation) occurred in March 2016 which reached -0.45. The average inflation during the observation period was 0.45 with a standard deviation of 0.69. Inflation that is too large will have an impact on the decrease of people's purchasing power. While inflation which is too small shows that the economy is not running well.

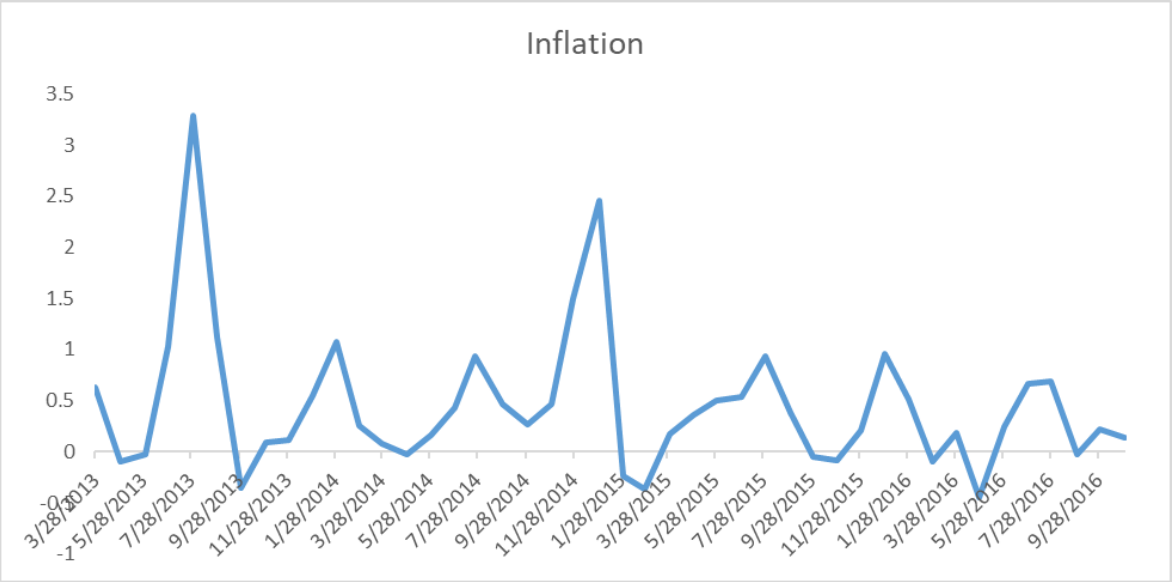

Figure 4. Inflation Trend
Source: Central Bureau of Statistics, 2017

The rupiah exchange rate against the US dollar during the observation period has fluctuated but it tends to increase. That is, during the period of observation the rupiah against the US dollar tended to weaken. In the early period of observation, the rupiah exchange rate against the US dollar was at level Rp9.719 per dollar and became the lowest exchange rate during the observation period. While in the last period of observation the exchange rate of rupiah to US dollar was at the level of Rp13.050 per dollar. The highest exchange rate (the weakest rupiah) was Rp14.657 which occurred at in September 2015. In that month the rupiah experienced pressure from both sides at the same time that the pressure from within the country where Indonesia experienced a large economic slowdown and foreign pressure which one of them is the US interest rate increase Fed.

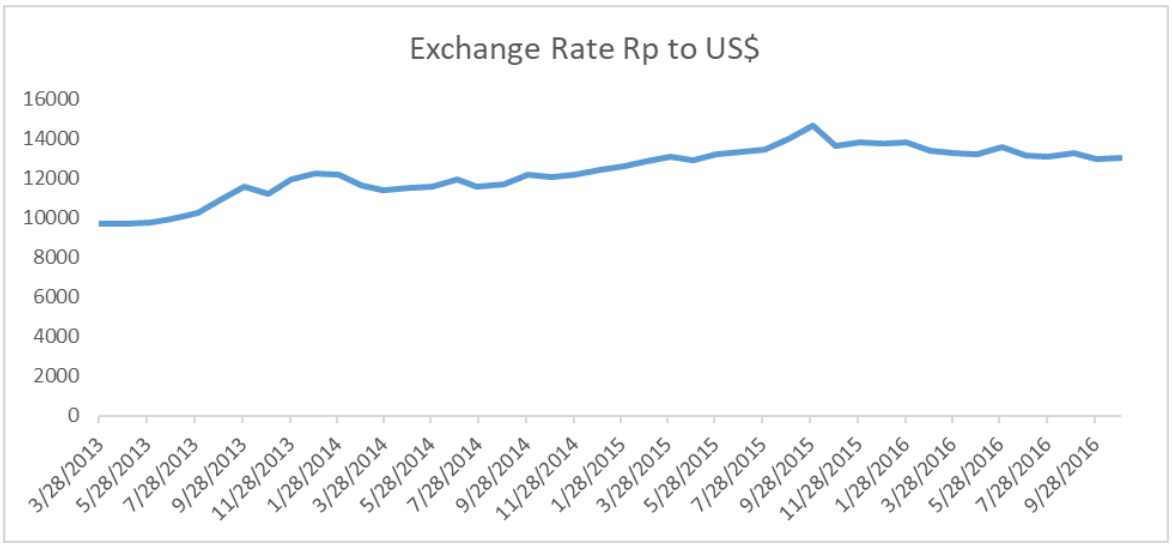

Figure 5. Trend of Movement of Rupiah Exchange Rate against US Dollar
Source: Central Bank of Indonesia, 2016

The last variable used in this study is the reference rate (BI Rate). At the end of the observation period, there is a change in the reference rate from the initial interest rate of Bank Indonesia (SBI / BI Rate) to BI 7 Day Repo Rate. This change is based on lack the effectiveness of the BI Rate in terms of influencing the credit interest rate set by the institution to creditors. Bank Indonesia interest rates have been used as government instruments in controlling lending rates of banking institutions. However, in practice this SBI is not effective in controlling lending rates of banking institutions.

The change in the reference interest rate resulted in a substantial decline in the reference interest rate. Starting in July 2016, the Central Bank of Indonesia declared the benchmark interest rate change from BI Rate to BI 7 Day Repo Rate with a smaller value. Therefore, in Figure 6, the graph declined sharply after July 2016. Until the end of the observation period, the downward trend in the reference interest rate was steadily declining. The last value and became the lowest interest rate of interest is 4.75 percent.

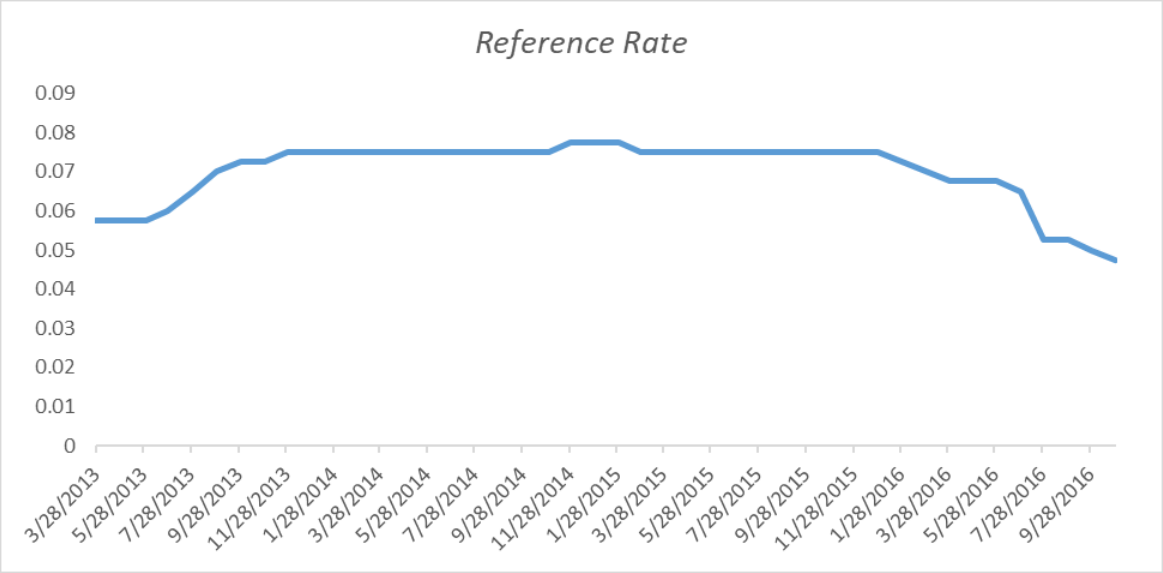

Figure 6. Movement Trend of Reference Rate
Source: Central Bank of Indonesia, 2016

These variables, according to several studies, influence each other as the results of the study of Nebojsa et al. (2016), Plihal (2016), Naifar (2016), Boons (2016), Asgharian et al. (2015), and Altinbas and Biskin (2015). In Indonesia's case, by using the Dynamic Conditional Correlation (DCC) method, the relationship of these six variables can be viewed dynamically. This is necessary because in every time of macroeconomic conditions and ISSI and IDX Composite (IHSG) often change, and of course, the relationship of six variables will also change according to those various conditions. Thus, the DCC method will be more objective in determining the relationship between the six variables.

Using the DCC method, the correlation between the ISSI variable with IPI and IDX Composite (IHSG) with IPI is varied along with the observation (Figure 7). In the first and second months (March and April 2013), the relationship between ISSI and IPI is relatively small (not reaching 0.2). However, after the fifth period, the relationship between ISSI and IPI has increased significantly. Even in the 10th period, which is in December 2013, the correlation between ISSI with IPI reaches 0.7. In other words, in that period, the relationship between ISSI and IPI is closely related. However, after that, the level of correlation between ISSI and IPI decreased. In August 2014, the correlation relationship between ISSI and IPI experienced a change of sign (to be negative) and then fluctuated in the range of zeros. In October 2015, the level of correlation of the ISSI relationship with IPI was negative (-0.68). In the final observation period, the correlation of the relationship between ISSI and IPI again changed the mark with a very significant value.

The level of correlation between IDX Composite (IHSG) and IPI also experienced various fluctuations. In the early period of the relationship between IDX Composite (IHSG) and IPI, it is in contrast to the level of correlation between ISSI and IPI. If the initial period, the level of correlation between ISSI and IPI has a positive sign, then the correlation between JCI and IPI has a negative sign. The correlation between IHSG with IPI and ISSI with IPI experienced the same movement in the middle

period. Since the 26th period, the correlation between IHSG with IPI and ISSI with IPI back on the contrary. In the final period (the 43rd and 44th periods), the correlation level movement relationship between IDX Composite with IPI and ISSI with IPI returns the same.

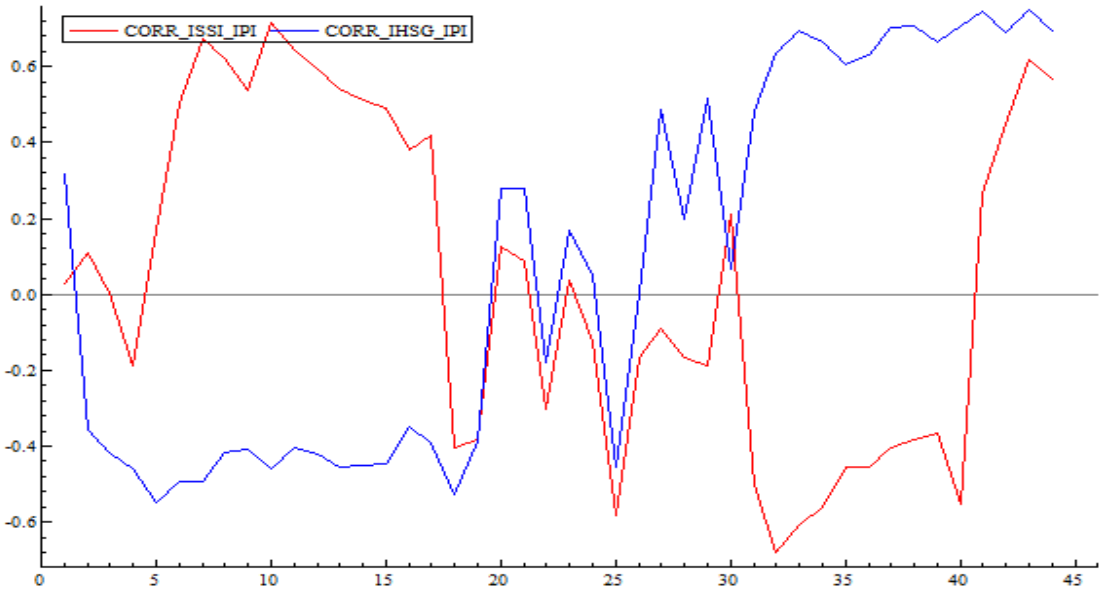

Figure 7. Dynamic Relationship of ISSI & IPI and IDX Composite & IPI
Source: Processed Results

The correlation level between ISSI with inflation and IDX Composite with inflation is relatively similar to the case of correlation level relationship between ISSI with IPI and IDX Composite with IPI. the level of correlation relationship between ISSI and inflation has a negative value in the initial period and then fluctuate between negative and positive in the middle period of observation. Fluctuating movement of ISSI and inflation occurred about the end period of observation. Since March 2016, ISSI and inflation's correlation value has a positive sign and an increasing trend until August 2016. In September 2016, the level of correlation relationship of ISSI and inflation became negative again.

In the correlation level relationship with this inflation variable, the IDX Composite variable seems to be the inverse variable of ISSI (Figure 8). Almost in all observation periods, the IDX Composite relationship with inflation has an opposite sign toward ISSI. Only in part of the mid-period and the final period of observation, the level of correlation of the IDX Composite relationship with inflation and ISSI with inflation has the same direction. Even the middle period, which starts from August 2014 until June 2015, has almost the same value. This similarity also occurred in October 2016 where the level of correlation between the ISSI and the IDX Composite against inflation has almost similar direction and value.

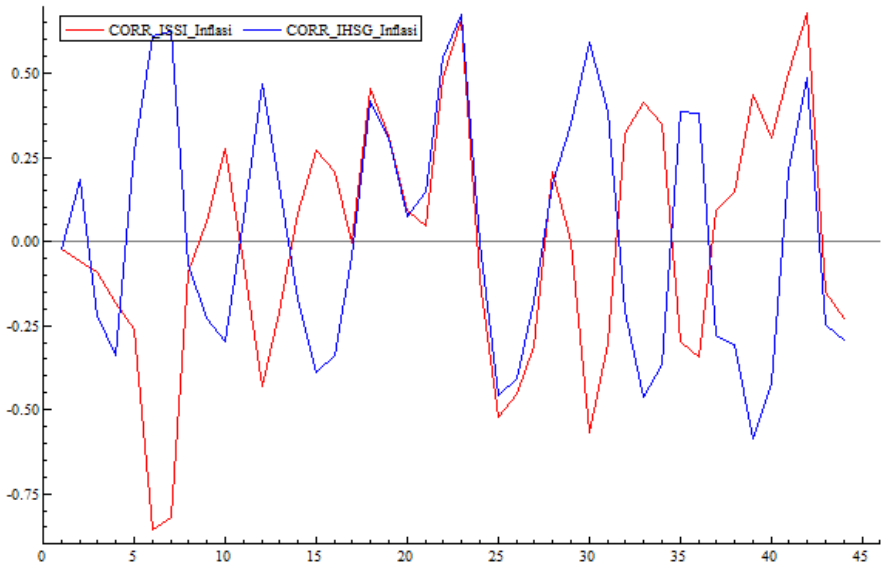

Figure 8. Dynamic Relationship between ISSI and Inflation and IDX Composite and Inflation
Source: Processed Results

Similar to the case of correlation relationship between ISSI and IDX Composite relationship with IPI and inflation, the level of relationship between ISSI and IDX Composite with the rupiah exchange rate against US dollar has the opposite sign (Figure 9). In the first five months of the initial observation period, the correlation of the relationship between ISSI and the negative exchange rate with the most outstanding correlation level is at the level of -0.4. After that, the relationship between ISSI and the exchange rate changed to positive, with the largest value being 0.5. On the contrary, the correlation relationship between IDX Composite and exchange rate has a negative value. The level of correlation of ISSI and the IDX Composite has the same direction in the middle period. After that, the ISSI and IDX Composite variables opposite again.

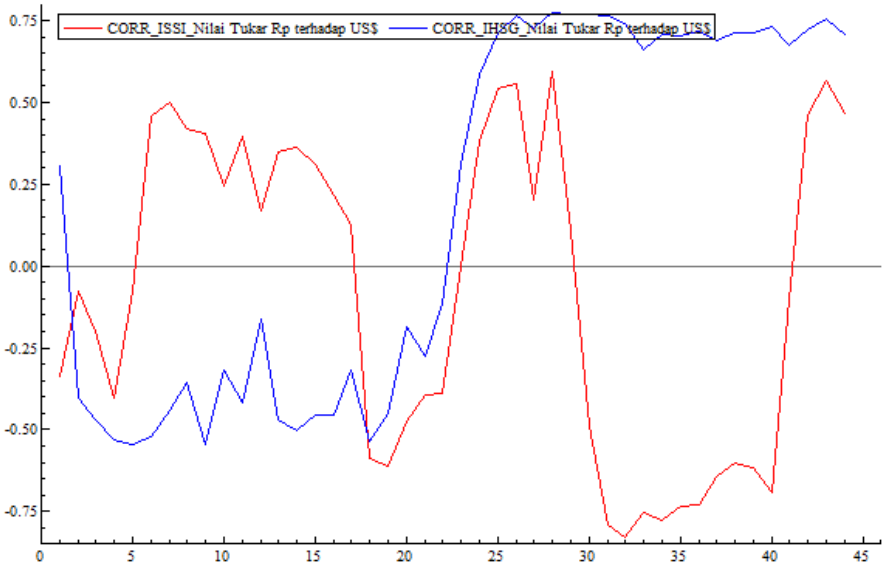

Figure 9. Dynamic Relationship between ISSI and IHSG and Rupiah Exchange Rate
Source: Processed Results

The correlation relationship between ISSI and IDX Composite with the reference interest rate has a very different value. The correlation of the dynamic relationship between IDX Composite and the reference interest rate has an image like an upside-down "U" where the initial observation has a negative correlation value. In the middle period, it becomes positive and stable in the range 0.0 - 0.25. At the end of the period, the correlation relationship between the Composite Index and the reference interest rate became negative with a great value of 0.8. In other words, in the last period, the level of correlation between IDX Composite and the reference interest rate has almost perfect value (significantly correlated).

The opposite occurs at the level of correlation relationship between the ISSI and reference rates. The correlation level of the relationship between ISSI and the reference rate fluctuates between positive and negative within a relatively short period. In the four months of the initial observation period, the level of correlation of the ISSI relationship with the reference rate negative value then changed again to be positive in the next two months. This positive value did not long-lasting. From October 2013 until July 2014, the ISSI relationship with reference interest rate was negative again. After that, it was back again to be positive, with the most significant value reached 0.5. In the last four months of the observation period, the correlation value between ISSI and the reference interest rate became negative, with a considerable value of 0.8.

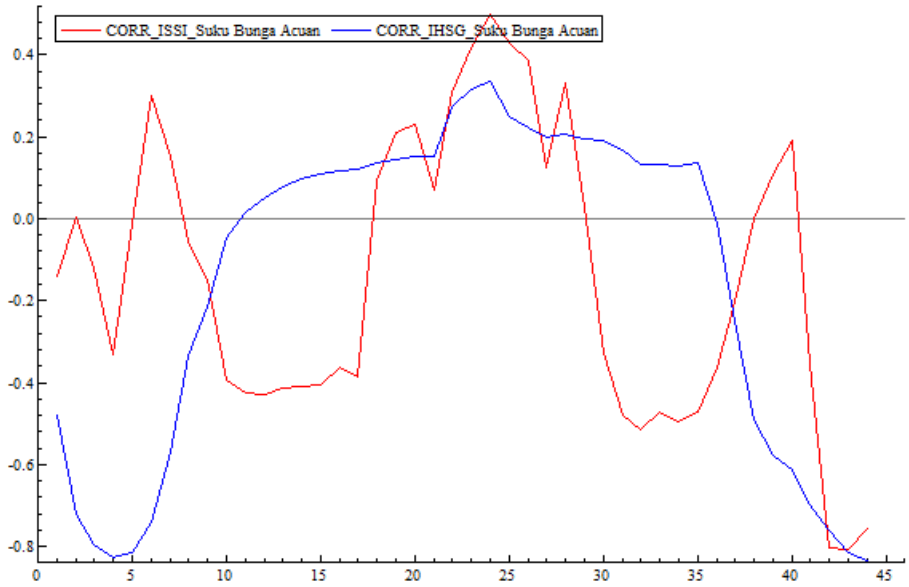

Figure 10. Dynamic Relationship of ISSI and IDX Composite toward Reference Interest Rate
Source: Processed Results

The correlation relationship level of ISSI and IDX Composite has fluctuated as well. In the beginning period of observation, the relationship between ISSI and IDX Composite is negative. However, in the mid-period of observation, the value of correlation level changed into positive, which the highest value reaches 0,5 and the lowest value is 0.04.

By the end of the observation period, the correlation value between ISSI and JCI is negative

again, with the most significant correlation value being 0.7. For some periods, the correlation value between ISSI and IDX Composite survives in the range of values 0.6 - 0.7. However, in the last four months, the correlation value between ISSI with IDX Composite changed back to positive, with the immense value reaching 0.53 and the smallest value of 0.08.

The changing pattern of relationships with positive and negative values indicates that the average correlation between the two variables is very low. With the significantly changing pattern, it will be complicated for the government to create a policy that can influence both ISSI and IDX Composite's movement pattern. Macroeconomic variables cannot be used as an effective instrument to influence the Indonesian capital market movement pattern, either the capital market as a whole or the particular capital market of sharia stock.

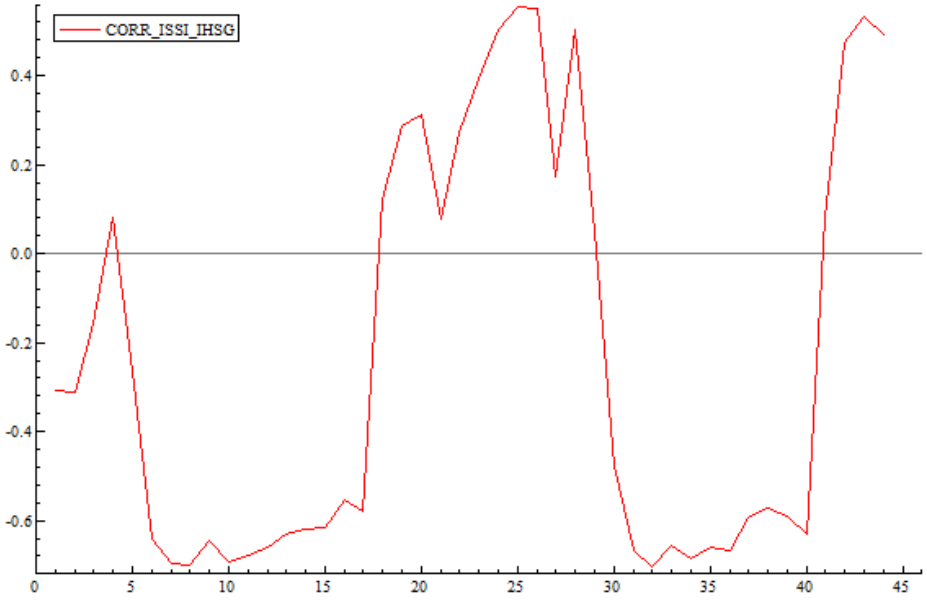

Figure 11. Dynamic Relationship of ISSI and IHSG
Source : Processed Results

CONCLUSION

Based on the DCC method, it can be seen that the four macroeconomic variables have a changing correlation pattern. The changing pattern is not only on the value scale but also on the positive and negative mark changes. It shows that macroeconomics variables do not have any significant influence on ISSI and IDX Composite. Furthermore, vice versa, ISSI, and IDX Composite have not any significant influence on macroeconomic variables. The changes of ISSI and IDX Composite and macroeconomics are caused by other factors that do not exist in this research. The fluctuation. The fluctuating level of correlation between IDX Composite and ISSI also indicates that these two stock indices cannot be used as instruments to diversify stock portfolios to decrease the risk level by using the mean-variance model from Markowitz. The movement pattern between the two stocks tends to be random where the one with the other does not affect each other.

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