

## Macroeconomic Variables, International Islamic Indices, and The Return Volatility in Jakarta Islamic Index

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**Abstract.** *According to understand the behavior of Islamic equity markets the primary objective of this research is to analyze the effect of macroeconomic indicators and International Islamic Index on return volatility of Jakarta Islamic Index. The analysis method used in this study is AutoRegressive Conditional Heteroscedastic-Generalized AutoRegressive Conditional Heteroscedastic (ARCH-GARCH). The result of this research showed that all variables, i.e., BI rate, inflation rate, IDR-USD exchange rate, DJIUS index, DJIUK index, FTSJP index and FTSMY index have a simultaneously significant impact on return volatility of JII. While t-test results show that BI rate, IDR-USD exchange rate, DJIUK index and FTSMY index have a substantial effect on return volatility of JII.*

**Keywords:** *macroeconomic variables, international Islamic indices, volatility return.*

**Abstrak.** *Untuk memahami perilaku pasar ekuitas Islam, tujuan utama dari penelitian ini adalah untuk menganalisis pengaruh indikator makroekonomi dan Indeks Islam Internasional terhadap volatilitas Indeks Syariah Jakarta. Metode analisis yang digunakan dalam penelitian ini adalah Auto Regressive Conditional Heteroscedastic-Generalized Auto Regressive Conditional Heteroscedastic (ARCH-GARCH). Hasil penelitian menunjukkan bahwa semua variabel yaitu tingkat suku bunga BI, tingkat inflasi, nilai tukar IDR-USD, indeks DJIUS, indeks DJIUK, indeks FTSJP dan indeks FTSMY secara simultan berpengaruh signifikan terhadap volatilitas return JII. Sedangkan hasil uji t menunjukkan bahwa BI rate, kurs IDR-USD, indeks DJIUK dan indeks FTSMY berpengaruh signifikan terhadap volatilitas return JII.*

**Kata kunci:** *variabel makroekonomi, indeks saham internasional, tingkat pengembalian volatilitas*

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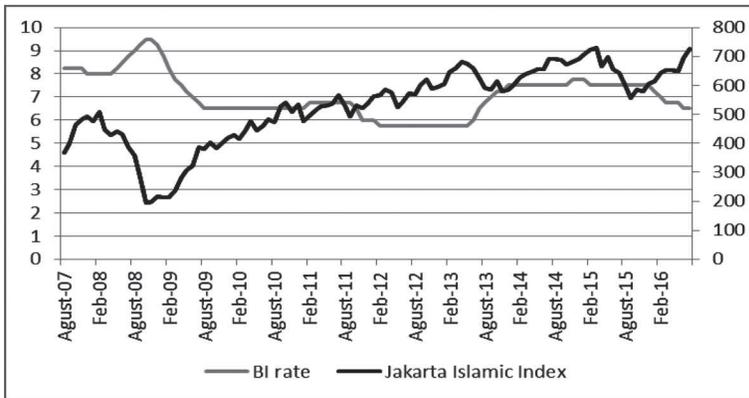
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## Introduction

Indonesian capital market throughout the last two decades showed an impressive trend. Scarcely did any capital market in other countries have a remarkable growth during the same period. The capital market was able to bounce back and showed the recovery trend after being crushed by the financial crisis, both in 1998 and 2008. Had the stakeholders and investors not kept being optimistic, it would be prolonged lasting crisis ever. The trend of improvement in the Indonesian capital market conditions cannot be separated from market optimism so that the industrial sector in Indonesia will continue to grow.

With the same goal of improving the return on investment (ROI), market actors should remain to be wary of the influence arising from the dynamics of macroeconomic indicators, so the existence of risk and return appears. To be careful is not only needed to be done by those who invest in conventional stocks but also those investors who choose Islamic value related-stock investment (sharia-compliant stock). It caused by the dynamics of macroeconomic indicators and those indicators affect the performance of the industrial sector so that financial assets such as stocks fluctuated. Thus, an investor ability in forecasting to macroeconomic changes will be very useful in stock investments.

Figure 1. The Change of JII and BI rate in 2007-2016



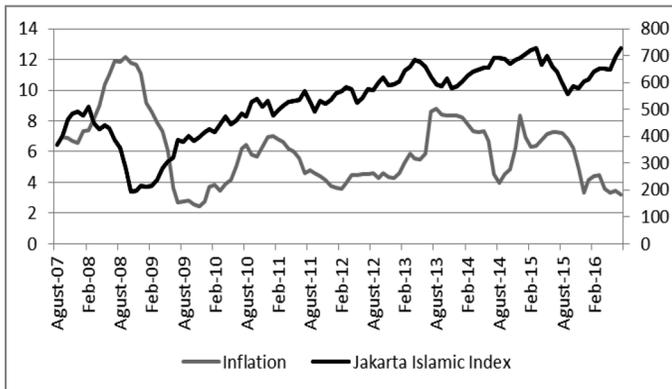
Source: Indonesian Stock Exchange (IDX) and Bank Indonesia

The interest rate as one of the macroeconomic indicators can affect investment activity in the stock market. This fact is due to the interest rate can influence the changes in the level of corporate profits. Increases in interest rates will increase the cost of production and investment costs so that profits earned will

reduce. Meanwhile, the decline in profit is a fundamental indicator of a decrease in the value of shares. BI rate showed an upward trend per December 2007 - November 2008 at 9.5% and followed by a correction of 47% JII. Improved BI rate during the period December 2007 - November 2008 gave an adverse effect on the fluctuation of JII. Instead, the tendency of decreasing BI rate after that time until January 2013 signaled the strengthening of stock indices in the equity markets, particularly the index JII (See Figure 1). Tanjung (2014) stated that Jakarta Islamic Index much volatile than the theory predicted.

Inflation reflects overall price increases in an economy. The high inflation is enough to give rise to social costs such as reduced purchasing power. This data means that the ability of people to make the consumption of goods and services would lower so that the company's sales revenue may decline. In the global financial crisis of 2008, inflation reached 11.85% over that time followed by a decline in the index JII about 47% by August 2007 - November 2008. Based on Figure 2 in the period, the inflation rate had an impact on JII index weakened significantly. By contrast, declined inflation and tended to be stable may be one signal of the strengthening of the stock price index in the capital market as can be observed in the development of the index JII period July 2008 to January 2013.

Figure 2. The Change of JII and Inflation in 2007-2016



Source: Indonesian Stock Exchange (IDX) and Bank Indonesia

Third, the effect of exchange rate fluctuation also participated in on economic activity. Changes in exchange rates may have an impact on the industry's performance changes. Depreciation condition on exchange rate can increase the export earnings of the company. Export opportunities occur because domestic goods become more competitive with lower selling prices counted in the real exchange rate. However,

the instability of exchange rate will also interfere with the performance of various industries, particularly industries that utilize raw materials imports and settlement of liabilities denominated in foreign currencies. This data can lead to a decrease in the price index of price stocks. As of August 2007 - November 2008 depreciated by 22% while the index JII corrected by 47% based on the period (See Figure 3).

Figure 3. The Changes of JII and IDR-USD exchange rate in 2007 - 2016



Source: Indonesian Stock Exchange (IDX) and Bank Indonesia

Along with globalization and economic integration, macroeconomic factors that influence the risk and return of stock price index not only from the domestic sphere but also from international factors. The turmoil in the economy of a country can affect the economies of other countries. In other words, the systemic risk occurs in these conditions. Simorangkir (2016) explained that the spread of failures on an element to the other part was a systemic risk. Meanwhile, Wahyudi (2013) revealed that the systemic risk was the risk that the impact caused a domino effect dragging the project or institution or sector or even other countries that affected to such risks, or the effect on the overall market or the existing system. These risk factors commonly associated with macroeconomic variables or sectoral or geographical conditions or other market indicators (Wahyudi, 2013). In other words, systemic risk can regard as market risk.

History showed that the fall prices of the bond (mortgage-backed securities) that were held on by Lehman Brothers ended in the bankruptcy of one of the largest investment bank in the United States. Bankruptcy did not just stop at the institution. The collapse of Lehman Brothers led to a crisis of public confidence in the market. Not once did the crisis stop there dragging one institution toward failure. Other leading financial institutions such as Northern Rock, Wachovia, FORTIS, AIG and

Merry Lynch experienced bankruptcy following the mortgage crisis of 2008. The crisis also spread to various regions such as Europe and Asia with the corrected index of stock prices in that region. In fact, the source of the crisis came from the United States (See Table 1).

Table 1. Development of Global Stock Index During Subprime Mortgage Crisis

Country	Regional Stock Price Indices	Stock Price Index Change Per July 2007-November 2008
USA	Standard and Poor's (S&P 500)	-43%
USA	Dow Jones Industrial Average (DJIA)	-33%
England	Financial Times Stock Exchange (FTSE)	-33%
France	Cotation Assistee en Continu (CAC 40)	-43%
Japan	Nikkei 225 (N225)	-51%
Hong Kong	Hang Seng Index (HSI)	-40%
Malaysia	Kuala Lumpur Stock Exchange	-37%
Indonesia	Indeks Harga Saham Gabungan (IHSG)	-47%

Source: Investing.com with processing

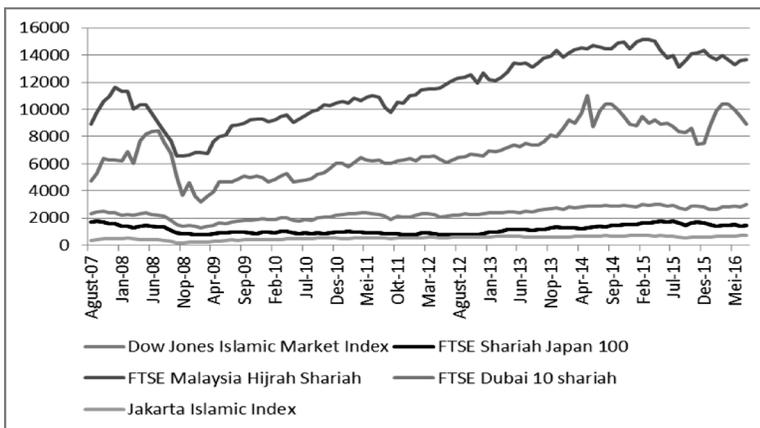
As an investor, the fluctuation of the stock index as a benchmark of profitability could lead to funding mobility. Thus, the crisis in the US also resulted in various regional stock market corrected in depth. The subprime mortgage crisis made the repatriation of US dollar occurred during the global financial crisis so that the different regional stock indices experienced a correction. This fact occurred due to a decrease in the stock price index as benchmark representing a negative profit. Moreover, withdrawal of stock ownership by investors during the crisis period in 2008 rationally done to avoid higher losses.

Stock markets in developed countries are considered influential on stock exchanges in other countries including the stock exchanges in the United States, Britain, and Japan. As the stock market influence, the volume of transactions in the capital markets in these countries have a high value because it supported by the number of go-public companies, the number of investment instruments, and its market capitalization. According to World Federation of Exchanges report, the market capitalization of NYSE stock market reached 19.223 billion dollars, while the Japanese stock market reached 4.485 billion US dollars. Stock markets in developed countries perceived to be able to mobilize investors fund (capital

mobility) from various countries so that fund was ready to move quickly. Also, the Islamic stock market in Malaysia even considered here as important market perceiving that Malaysian capital market served as an investment destination chosen by Islamic investors worldwide (See Figure 4).

Stock investment-related research had done in various countries. Results of the study conducted by Majid and Yusof (2009) in Malaysia shows that inflation and exchange rates negatively affect the stock price index. Meanwhile, interest rates have a positive influence on the stock price index. However, the weakness of the study has not incorporated the effect to the regional index in explaining the impact on stock index returns. Meanwhile, research conducted by Subakti et al. (2016) show the DJIA and exchange rate have the positive effect on the stock price index. Meanwhile, BI rate, inflation and gold prices do not have a significant impact on the volatility of the stock price index. The study was done by Surbakti et al. (2016) still has the limitation because regional index studied the only Dow Jones Industrial Average (DJIA) and it does not include another regional stock index. Based on this background, researchers will research “The Effect of Macroeconomic Indicators and International Islamic Indices on Return Volatility of Jakarta Islamic Index (JII).” The research will complement and enhance previous studies that the empirical findings of this study are expected to be a relevant contribution of risk factors affecting the stock index. Based on the problem described in the background, some of the issues that can identify are how do the macroeconomic indicators and International Islamic Indices affect JII return volatility simultaneously and how do the macroeconomic indicators and International Islamic Indices affect JII return volatility partially.

Figure 4. Regional Islamic Stock Index 2007-2016



Source : Investing.com with processing

## Literature Review

There are several studies attempted to test the effect of the stock price index and the macroeconomic variables to fluctuations in the stock price index. Surbakti et al. (2016) researched in 2014 which aimed to examine the effect of macroeconomic variables and international stock index volatility of JCI index using ARCH. The empirical results of the study were the DJIA, and IDR-USD exchange rate had a significant positive correlation to the volatility of JCI return. While the BI rate and inflation rate variable negatively influenced return volatility of JCI but those variables did not affect return volatility of JCI. Meanwhile, the gold price variable had a positive coefficient, but it did not significantly affect return volatility of Jakarta Composite Index.

The vast majority of empirical studies investigate the relationship between Islamic and conventional financial markets as well as between Islamic financial markets and macroeconomic variables by using linear models. Hammoudeh et al. (2014) show that the Dow Jones Islamic Market index exhibits significant dependence with three major global conventional equity indices (Asia, Europe, and the USA). Besides that, the global factors namely oil prices, stock market implied volatility, the U.S. 10-year Treasury bond interest rate, and the 10-year European Monetary Union government bond index also had an impact on Islamic market index. Sakti and Harun (2013) found a co-integration between Islamic stock prices and macroeconomic variables specifically exchange rate, industrial production, inflation rate, and money supply. Hammoudeh et al. (2014) reveal a significant linear and nonlinear causality between the Islamic and conventional stock markets and between the Islamic stock market and interest rates. They affirm that the nonlinearity results are more credible because of the possible existence of structural breaks, asymmetry and regime switching in the markets and the relevant economic and financial variables. (Bahloul, et al., 2017).

Rjoub et al. (2009) also participated in conducting research that aimed to test the impact of macroeconomic variables on stock prices in the Turkish stock market in 2009. Independent variables used by Rjoub et al. (2009) is the interest rate (TERST), inflation (UNINF), risk premium (RIKPR), exchange rate (EXCGR), unemployment (UNEMP) and money supply (MONSP). The exchange rate (EXCGR) had adverse effect on the share price returns. Meanwhile, the interest rate (TERST), inflation (UNINF), risk premium (RIKPR), unemployment (UNEMP) and money supply (MONSP) had a positive effect on most stock portfolios formed.

Majid and Yusof (2009) also conducted research that aimed at testing the effect of macroeconomic variables on stock prices in the Malaysian stock market in 2009.

Variables used by Majid and Yusof (2009) were the Kuala Lumpur Shariah Index (KLSI); Money Supply (M3), Treasury bill rates (TBR) Production Price Index (IPI), the real exchange rate (REER) and the Federal Reserve Rates (FRR). IPI had no significant effect on either KLSI on the model 1 and model 2. The M3 had a significant positive impact on KLSI in model 1. REER on model 1 and 2 had a significant adverse effect on KLSI. TBR in model 2 and FFR in model 1 & 2 had a significant positive effect on KLSI. Research that conducted by Beik and Fatmawati (2014) also aimed to examine the influence of international Islamic stock price index and the macroeconomic variables of the Jakarta Islamic Index. The variables used were JII as the dependent variable. Besides that, Index of Production (IPI), consumer price index (CPI), money supply (M2), exchange rate, BI rate, SBIS, Dow Jones Islamic EU, the Dow Jones Islamic Market US, Dow Jones Islamic Malaysia (DJIMY), the Dow Jones Islamic Japan (DJJJP) as independent variables.

A similar study also conducted by Alfin Merancia (2010), which aimed to examine the influence of international Islamic stock price index and the macroeconomic variables on the risk of Jakarta Islamic Index and JCI. Research results indicated that interest rates were the cause of instability risk of JII and JCI. The dependent variable, the risk of Jakarta Islamic Index (JII), the independent variable exchange rate, SBI, Dow Jones and Nikkei significantly affect the risk of JII. While the inflation did not significantly affect on Jakarta Islamic index. On the other hand for the dependent variable risk of a composite stock price index (CSPI), SBI and the Dow Jones stock index had a significant effect on risk of CSPI, while inflation rate, exchange rate, and Nikkei index is not significant.

Some recent studies on Islamic finance have dealt with the links between Islamic financial markets and macroeconomic variables as well as between Islamic and conventional financial markets. Majid and Yusof (2009) study the connection between the monetary policy volatilities and the volatility of stock returns in both conventional and Islamic stock markets in Malaysia during the period from January 1992 to December 2000. They show that the interest rate volatility affects the conventional stock market volatility but does not have, on the contrarily any effect on the Islamic stock market volatility. They found, however, that for Islamic stock market volatility, the exchange rate is the crucial indicator of economic instability. Using GARCH models, Albaity (2011) investigates the effect of monetary policy, interest rate and the rate of inflation on the Islamic stock market indices in Malaysia (Kuala Lumpur Syariah Index) and the USA (Dow Jones Islamic Market Index) over the period from April 1999 to December 2007. He finds that in the univariate models, the variance of the two indices influenced by money supply (M2 and M3) and inflation rate. Also, in the multivariate model, Dow Jones Islamic Market

Index is affected by the interest rate and the inflation rate in the mean and variance equations. In contrast, Kuala Lumpur Syariah Index is influenced commonly in the mean and variance equations by money supply M3 and the inflation rate.

Based on the literature review, shows that measurement of volatility in stock market becomes common in general. Thus, we can also infer that there is a gap that needs to fill, which not only to update the works mentioned above but even because a comprehensive study about Islamic capital market, therefore this research has purpose of measuring the influence of macroeconomics variables, International Islamic indices toward Jakarta Islamic Index.

## Method

This research is mainly using time-series secondary data derived from yahoo finance reports, statements publication, and other related, relevant data source if necessary. It can be in the form of digital data such as websites, digital files or non-digital data such as paper, magazine, and sort. This research purpose is to analyze the effect of macroeconomics indicators and International Islamic Index ( Dow Jones Islamic U.S index (DJIUS), Dow Jones Islamic U.K index (DJIUK), FTSE Japan Shariah 100 index (FTSJP) and FTSE Malaysia Hijrah Shariah index (FTSMY)) on return volatility of Jakarta Islamic Index. To achieve that purpose data processing techniques which will be used are as follows: First, Autoregressive Conditional Heteroscedasticity (ARCH) which the model is.

$$Y_t = b_0 + b_1 X_t + e_t \quad (1)$$

Heteroscedasticity that occurred in the time series data due to an element of volatility. Financial data in a certain period have high volatility and also high error variable, then those followed by a period with low volatility and error variable which is also low. A variance of error variable under these conditions will depend on the variance volatility of error variable prior period. In other words, a variance of error variable strongly influences by the error variables prior period. Variance equation of error variable in the ARCH method can write as follows:

$$\sigma^2_t = \alpha_0 + \alpha_1 \varepsilon^2_{t-1} \quad (2)$$

Equation (2) states that the variance of disturbance variable,  $\sigma^2_t$ , has two components: constants and past error variables (lag), which are assumed to be the square of the error variable on past period. Model of error variable,  $e_t$ , is conditional heteroscedasticity in the error variable  $e_{t-1}$ . By taking information conditional heteroscedasticity of  $e_t$ , the parameters  $b_0$  and  $b_1$  can be estimated more efficiently. Equation (1) is equation for the output of the equation of mean (conditional mean) while equation (2) is called the equation of variance (conditional variance).

If variance of the error variable  $e_t$  depends only on the volatility of squared error variable of last period as contained in (2), the model is ARCH (1). Thus in general, the model ARCH (p) can be expressed in the following equation:

$$Y_t = b_0 + b_1 X_t + e_t \quad (3)$$

$$\sigma^2_t = \alpha_0 + \alpha_1 \varepsilon^2_{t-1} + \alpha_2 \varepsilon^2_{t-2} + \dots + \alpha_p \varepsilon^2_{t-p} \quad (4)$$

Second, the GARCH model, understanding can be preceded by the following regression model:

$$Y_t = b_0 + b_1 X_t + e_t; \text{ where } e_t \text{ is residual data.} \quad (5)$$

While variance of residual data in GARCH model can be written as follows:

$$\sigma^2_t = \alpha_0 + \alpha_1 \varepsilon^2_{t-1} + \lambda_1 \sigma^2_{t-1} \quad (6)$$

In the GARCH model,  $\sigma^2_t$  variance of residual data are not only influenced by the residual on last period  $\varepsilon^2_{t-1}$ , but also influenced by the variance of residual data on last period  $\sigma^2_{t-1}$ . Residuals model in equation (5) is called GARCH (1,1) because the variance of residual is affected by residual data and variance for both previous period. In general, GARCH model, i.e GARCH (p, q) can be expressed through the following equation:

$$\sigma^2_t = \alpha_0 + \alpha_1 \varepsilon^2_{t-1} + \dots + \alpha_p \varepsilon^2_{t-p} + \lambda_1 \sigma^2_{t-1} + \dots + \lambda_q \sigma^2_{t-q}$$

## Result and Discussion

Stationarity test used to identify whether our time series data contain autocorrelation or not. Table 2 shows that dependent variable, JII return volatility, is stationary at 5% significance level. All independent variables are not stationary at 5% significance level. It needed to examine them to 1 differencing stationarity test. After being tested on one differencing stationarity test, all independent variables now have been stationary at 5% significance level because of their ADF value are higher (>) than the critical value (5%).

Heteroscedasticity test used to detect whether the data contain ARCH GARCH element. This result did because heteroscedasticity is a detection element of ARCH. Heteroscedasticity testing here was conducted using the method of White Heteroscedasticity test (No Cross Term). The result can show at Table 3. Based on White Heteroscedasticity test result (Table 3), Probability of obs \* R-squared is 0.0146 or less than 5% or 0.05. Therefore, the data in this study contain heteroscedasticity. Did the data include heteroscedasticity elements, the test procedure may be continued on ARCH GARCH method to determine the effect of independent variables on the dependent variable.

Table 2. Stationarity Test Summary

Variable	Stage	ADF test Statistic	Critical Value 5%	Result
Return JII	Level	-7.834047*	-2.889753	Stationary
BI rate	Level	-2.228027	-2.890037	Not Stationary
	1 difference	-4.434045*	-2.890037	Stationary
Inflation rate	Level	-2.480754	-2.890037	Not Stationary
	1 difference	-6.461414*	-2.890037	Stationary
Exchange rate	Level	-0.618387	-2.889753	Not Stationary
	1 difference	-9.130402*	-2.890037	Stationary
DJIUS index	Level	-1.886264	-2.889753	Not Stationary
	1 difference	-11.50367*	-2.890037	Stationary
DJIUK index	Level	-2.672777	-2.889753	Not Stationary
	1 difference	-10.16899*	-2.890037	Stationary
FTSJP index	Level	-1.399115	-2.889753	Not Stationary
	1 difference	-8.733266*	-2.890037	Stationary
FTSMY index	Level	-0.586845	-2.889753	Not Stationary
	1 difference	-9.101977*	-2.890037	Stationary

\*the test result is stationary at the 5% significance level.

To search for the best model whose the research data is heteroscedasticity, also those do not meet the assumptions of Gauss Markov theorem, researchers need to do significance testing in searching for the effect of independent variables by using the ARCH GARCH. As for the significance parameters using fixed critical value which is said to be significant if the significance value below 0.05 or 5%. Here is an overview of the testing of the various models that have established.

Table 3. Heteroscedasticity Test

Heteroskedasticity Test: White (No Cross Trem)			
F-statistic	2.772604	Prob. F(7,95)	0.0115
Obs*R-squared	17.47294	Prob. Chi-Square(7)	0.0146
Scaled explained SS	20.21671	Prob. Chi-Square(7)	0.0051

For the best model on the test, this time is GARCH (1,1). This result because although the views of these indicators GARCH (2,2) and GARCH (2,1) looks

better than GARCH (1,1), but some coefficients of independent variables in the model are not consistent with the relevant theory underlying the relationship of these variables. Surbakti et al. (2016) explained that the first thing noticed to choose the best model is the feasibility or validity of the model, then regarding significance, the sign of coefficients, AIC and SC with the smallest value are selected as the best model. Besides, researchers need to look at the data for autocorrelation existence and its normality. Only did the model GARCH (1,1) qualify for those assumptions because the model normally distributed and spared from autocorrelation. The following is the regression output of ARCH GARCH.

Table 4. GARCH Model Summary

Model	R <sup>2</sup>	Akaike info criterion	Schwarz criterion	Normality	Autocorrelation
GARCH (1,1)	0.617485	-3.538871	-3.257492	Yes	No
GARCH (2,2)	0.630938	-3.449307	-3.116768	Yes	Yes (Lag 2,7&8)
GARCH (1,2)	0.604119	-3.501443	-3.194484	Yes	Yes (Lag 1)
GARCH (2,1)	0.630746	-3.464110	-3.157151	Yes	Yes (Lag 1&8)

Based on Table 5, F test can be done with the following formula:  $[R^2 / (k-1)] / [(1-R^2) / (n-3)]$ . It is known that the coefficient of determination 0.617485, the number of variables  $k = 8$  and the number of data 104.  $[0.6175 / (8-1)] / [(1-0.6175) / (104-3)]$ . Thus, the calculated F value is 23.83. Meanwhile, F table is 2.01. If F count is greater than F table, we will reject H0 and accept Ha. In other words, together do independent variables affect significantly on the dependent variable.

The result of adjusted R-square value in the regression is used to determine the amount of the dependent variable that is influenced by independent variables. The output above shows that the return variable of Jakarta Islamic Index (JII) described by 0.5893 (58.93%) by the variable BI rate, inflation, currency IDR-USD, DJIUS, DJIUK, FTSJP, and FTSMY together. While 0.4107 (41.07%) as the rest may explain by other variables that are not included in the model.

BI rate coefficient indicates a value of -0.057342, which means if the BI rate arises by 1%, return volatility of JII will decrease by 0.057342 *ceteris paribus*. The result of this study is similar to the outcome of research done by Beik and Fatmawati (2014) that the BI rate has a negative impact, but it is not significant. Similarly, the results found by Surbakti et al. (2016) that the BI rate not substantial effect on the Jakarta Composite Index. The negative relationship is consistent with the

theory of investor relations and interest rates. Increases in interest rates can decrease the willingness of corporate sector to invest due to the rising cost of investment. Although, the BI rate does not directly affect a company incorporated in the index JII. The increase in BI rate will affect the expected return on the scheme of the direct or indirect financing in the context of the dual banking system economy implemented in Indonesia. Thus, the increase in the BI rate could delay corporate sector investment and business expansion so that it can lead to lower profitability.

Table 5. ARCH GARCH Regression

Dependent Variable: RETURN_JII				
Method: ML ARCH - Normal distribution (BFGS / Marquardt steps)				
Sample (adjusted): 2008M01 2016M07				
Included observations: 103 after adjustments				
Convergence not achieved after 500 iterations				
Coefficient covariance computed using outer product of gradients				
Presample variance: backcast (parameter = 0.7)				
GARCH = C(9) + C(10)*RESID(-1)^2 + C(11)*GARCH(-1)				
Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.010577	0.003576	2.958057	0.0031
D(BI_RATE)	-0.057342	0.024933	-2.299848	0.0215
D(INFLATION)	-0.002604	0.006005	-0.433665	0.6645
D(IDR_USD)	-8.25E-05	1.13E-05	-7.318375	0.0000
D(DJIUS)	-1.29E-05	2.06E-05	-0.622744	0.5335
D(DJIUK)	0.000117	4.65E-05	2.513297	0.0120
D(FTSJP)	0.000118	7.37E-05	1.594073	0.1109
D(FTSMY)	3.02E-05	1.11E-05	2.734937	0.0062
Variance Equation				
C	2.46E-05	2.27E-05	1.083328	0.2787
RESID(-1)^2	-0.066416	0.010969	-6.054719	0.0000
GARCH(-1)	1.063629	0.000276	3847.163	0.0000
R-squared	0.617485	Mean dependent var		0.006130
Adjusted R-squared	0.589300	S.D. dependent var		0.066810
S.E. of regression	0.042816	Akaike info criterion		-3.538871
Sum squared resid	0.174154	Schwarz criterion		-3.257492
Log likelihood	193.2519	Hannan-Quinn criter.		-3.424903
Durbin-Watson stat	2.308035			

Inflation coefficient indicates a value of  $-0.002604$  which means that if inflation rises by 1%, the return volatility of JII will decrease by  $0.002604$  ceteris paribus. The result of this study is similar to the results of research done by Surbakti et al. (2016) that found a significant adverse effect of inflation on the Jakarta Composite Index. Moreover, Majid and Yusof (2009) also found the same finding that inflation variable had a substantial adverse impact on Islamic stock prices. Inflation has led to lower purchasing power, especially for consumers with fixed income. The relationship between inflation and Islamic stock index occurred when the level of purchasing power decreased due to higher inflation; thereby it will reduce people expenditure (consumption) on the products/output of the economy. This fact will reduce the profit of various industries due to decreased sales revenue. Majid (2016) found that the Inflation, money supply, and exchange rate affect the Islamic stock returns in Indonesia.

The coefficient of the rupiah against the US dollar showed a value of  $-0.0000825$  which means that if the exchange rate depreciates 100, return volatility of JII will decrease by  $0.00825$  ceteris paribus. The result of this study is similar to the results of research found by Majid and Yusof (2009) that the exchange rate had a significant adverse effect on Islamic stock index. Meanwhile, the result of the similar study also obtained by Beik and Fatmawati (2014) and Rjoub et al. (2009) that the rupiah exchange rate toward the US dollar had an adverse effect but not significant to the JII.

Effect of currency exchange rate fluctuations will be more dominant in influencing companies engaged in export and import. Variations in the form of an exchange rate, said, depreciation can directly affect the price of domestic goods, causing an increase in production costs of a company. This data will reduce the willingness of investors to invest in buying shares of the company. Also, a significant negative correlation could also mean that the number of foreign investors still dominate investment in Indonesian capital market. This fact causes that depreciation on exchange rate will be a negative sentiment for investors to release their share ownership in the Indonesian capital market. So that, the Islamic stock indices move lower.

Dow Jones Islamic-US (DJIUS) index coefficient indicates a value of  $-0.0000129$  which means if DJIUS index rises 100 points, return volatility of JII will decrease by  $0.00129$  ceteris paribus. The result of this study is similar to the outcome of research done by Beik and Fatmawati (2014) that the US Islamic stock market has a significant adverse effect on JII. While Indonesia, Japan, and Malaysia perceived as an alternative market. Along the US crisis of 2008, investors will move their stock investment into an alternative market in these countries to avoid more significant losses. Thus, the decline in US Islamic stock prices will cause transfer of funds to the Indonesian stock market. That is the explanation why there is a negative relationship between those Islamic stock market. Besides, the negative association may mean that investors prefer

to invest in countries with developed Islamic capital market. Preferences of people to invest in the country also supported with investment-grade ratings of AA + rating for the US issued by S&P. Although it is intended for debt securities, the assessment of the investment grade rating at least make the security and comfort sense for investors considering the risk of losing their investment funds due to bankruptcy.

Dow Jones Islamic-UK (DJIUK) index coefficient indicates a value of 0.000117, which means if DJIUK index rises 100 points, return volatility of JII will increase by 0.0117 *ceteris paribus*. The result of this study is similar to the results of research conducted by Beik and Fatmawati (2014) that the European regional Islamic stock market has a significant positive effect on the JII. The positive relationship means financial crisis exists in the USA may encourage investors to transfer their funds to the United Kingdom or Indonesia. This is due to the investors preference to invest in countries with developed Islamic capital market. As an alternative market, the Islamic capital market in the UK has the same investment attractiveness when compared to alternative markets in developing countries. Preferences of people to invest in this country also supported by investment grade ratings for the UK is AA rating by S&P. Although it is intended for debt securities, the assessment of the investment grade rating at least make the security and comfort sense for investors considering the risk of losing their investment funds due to bankruptcy.

Financial Times Stock Exchange Japan (FTSJP) index coefficient indicates a value of 0.000118, which means if FTSJP index rises 100 points, return volatility of JII will increase by 0.0118 *ceteris paribus*. The result of this study is different from the result of research conducted by Beik and Fatmawati (2014) that the Japanese Islamic stock market significant adverse effect on JII. This positive relationship between these two stock market is possible because the Islamic stock market in Japan is not as advanced as the USA Islamic stock market. This had implication when financial crisis occurred in the US, Islamic stock investors might transfer their funds to the UK, Indonesia, Malaysia or Japan as an alternative market. Also, considering Japan as an alternative market is also support by an investment grade rating of A+ issued by S & P. Achievement of the score is lower when compared with the US. Thus, investors will feel more comfortable to invest in USA.

Financial Time Stock Exchange Malaysia (FTSMY) index coefficient indicates a value of 0.0000302, which means if FTSMY index rises 100 points, return volatility of JII will rise by 0.00302 *ceteris paribus*. The result of this study is similar to the result of research conducted by Beik and Fatmawati (2014) that the Islamic stock price index has the significant positive effect on the JII. Malaysia Islamic stock market has a positive relationship with the Indonesian Islamic stock

market. This means that Malaysia Islamic Stock market is complementary to the Indonesian Islamic Stock market (JII). This positive relationship between is possible because the Islamic stock market in Malaysia might be perceived to be not as advanced as Islamic stock market in the United States. Implication due to this relationship was when the financial crisis in the US occurred, Islamic stock investors will transfer their funds to the UK, Indonesia, Malaysia or Japan as an alternative market. Also, the assessment of Malaysia as an alternative market is also support by investment grade A- rating issued by S & P. Achievement of the rating is lower when compared with the US. Thus, investors will feel more comfortable investing in the USA.

Kyereboah-Coleman and Agyire-Tettey (2008) found that the lending rates from deposit money banks hurt stock market performance and mainly serve as significant hindrance to business growth in Ghana. Again, while the inflation rate is found to have an adverse effect on stock market performance, the results indicate that it takes time for this to make effect due to the presence of a lag period. Kowanda et al. (2015) conclude that the Strait Time Index and Exchange rate affected on Indonesian stock index (IHSG).

## **Conclusion**

The variables used in this study have a high degree of volatility so that residual data are not constant or heteroscedastic. Thus, regression testing using Ordinary Least Square (OLS) here is not suitable. To test these data, the researcher used ARCH-GARCH model because this model does not look at heteroskedasticity as a problem, but this model utilizes heteroskedasticity element to create a model in a time series research. Tests conducted simultaneously shows that all independent variables simultaneously influence on the return volatility of Jakarta Islamic Index (JII). Domestic macroeconomic variables that have a statistically significant effect on the return volatility of Jakarta Islamic Index are the BI rate and exchange rate (IDR-USD). Both of these variables have a substantial adverse impact on the return volatility of JII. While, the inflation variable does not have a significant effect on the return volatility of Jakarta Islamic Index.

Meanwhile, the Dow Jones Islamic UK (DJIUK) and the Financial Times-Stock Exchange of Malaysia (FTSMY) are both positive effects on the return volatility of Jakarta Islamic Index. These findings are similar to studies conducted by researchers in the previous studies stating that these two Islamic stock markets were complementary to Indonesian Islamic stock market. The Dow Jones Islamic US (DJIUS) and the Financial Times-Stock Exchange Japan (FTSJP) however has no statistically significant effect on the return volatility of JII.

The implications of this study can be used as a reference and the development of literacy in Islamic finance. This result will encourage related institutions, universities, education ministries, regulators such as financial services authority and the financial industry to support Islamic capital market research in the field of Islamic finance, facilitation of writing and publication of international standardized scientific papers. For that, it is necessary to develop synergies and cooperation between elements or stakeholders in supporting the development of experimental works in this field. It is expected the possible scientific work in the area of Islamic finance in Indonesia in its various aspects can be recognized by the academic community at the international level.

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