

The Impact of Macroeconomic Variables on IHSG and JII: An ARDL Approach

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The Islamic capital market plays an important role in the growth of the economy in Indonesia. During its development, the performance of the stock index in a country is often influenced by other stock indices in other countries. This study tries to analyze dependence of macroeconomic variable towards Jakarta Islamic Index (JII) and Indonesia Composite Index (IHSG), using Autoregression Distributed Lag (ARDL). The results show that in a short term, the US S&P 500 and Singapore STI price index significantly affect both of the JII and IHSG price index. Also, the exchange rate and crude oil price significantly affect the JII and IHSG, respectively. In a long term, the money supply, exchange rate and Singapore STI price index significantly affect the IHSG.

Keywords: ARDL; Macroeconomic; JII; IHSG

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INTRODUCTION

The presence of the Islamic capital market in Indonesia plays an important role for the growth of the economy in this country. In the concept of economic growth, the capital market is an indicator of the stability of macroeconomic conditions where the capital market is an alternative source of financing for companies. In its development, the capital market acts as a place to raise capital. Meanwhile, from the public side, the Islamic capital market acts as an investment alternative to maintain the value of their currency. The progress of the capital market in Indonesia has occurred in line with the increase in public knowledge about how to invest optimally and is supported by domestic economic conditions.

The emergence of sharia products in the capital market initially started from the desire to accommodate the needs of Muslims who wish to invest in sharia principles. This was the background for PT Danareksa Investment Management to launch Danareksa Syariah on 3 July 1997. Then on 3 July 2000, the Indonesia Stock Exchange in collaboration with PT Danareksa Investment Management launched the Jakarta Islamic Index (JII). Furthermore, Islamic investment products in the capital market continued to grow with the presence of Islamic bond instruments (sukuk), Islamic mutual funds, and the Sharia Securities List (DES) which later transformed into the Indonesian Sharia Stock Index (ISSI).

Investment in Indonesia is currently experiencing a fairly good development. This is marked by the better performance of the Composite Stock Price Index (IHSG), LQ45, *Jakarta Islamic Index* (JII), and the Indonesian Sharia Stock Index (ISSI), which represent the actual conditions of the national Islamic capital market.

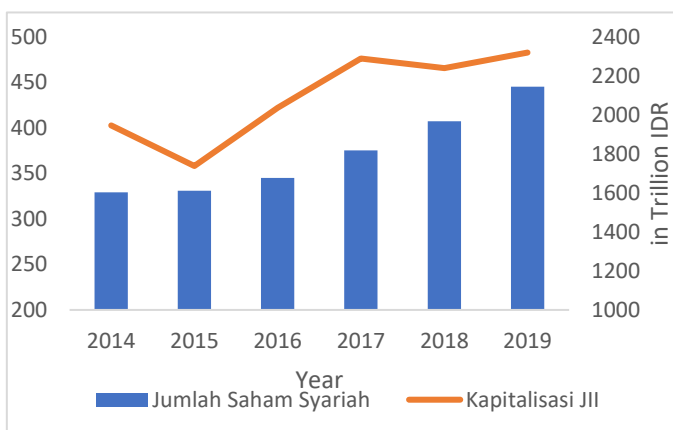


Figure 1: Islamic stock and market capitalization
Source: Financial Services Authority (OJK)

The graph above explains that the existence of Islamic stocks is in great demand by investors, this is illustrated by the number of Islamic shares which always increase every year. Furthermore, the Islamic stock capitalization value shown by the *Jakarta Islamic Index* (JII) has an increasing trend every year. This shows that the performance of the *Jakarta Islamic Index* has increased quite well.

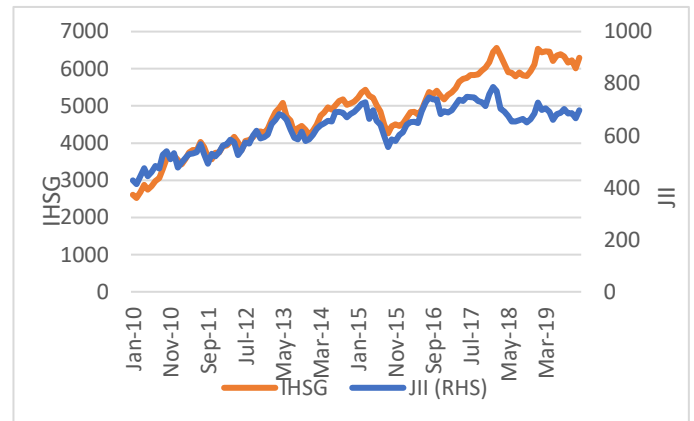


Figure 2: IHSG and JII in 2010-2019
Source: Investing.com

The figure above explains the development of the JCI and JII indices from the period January 2010 to December 2019. From the graph above it can be seen that the JCI and JII have strong attachments, which is indicated by almost the same movements, as in the period May 2015 to September 2015 where the two indices corrected quite deeply before rebounding in the next period, then fluctuating from March 2018 to December 2018.

In its movement, the movement of the stock index almost always fluctuated. Fluctuations that occur in the stock index can be influenced by macroeconomic variables. [Tangjitprom \(2012\)](#) explains that there are macroeconomic variables that affect the rise and fall of the stock price index, which can be grouped into four groups. The first group reflects general economic conditions such as employment levels and industrial production indices. The second group includes interest rate and monetary policy variables. The third group of variables focuses on the price level, which can be the general price level and the inflation rate or the price of a key asset such as the price of oil. The last group is variables involving international activities such as exchange rates and foreign direct investment.

One of the macroeconomic variables that influences the rise and fall of the stock price index is the world crude oil price. Crude oil is considered a driving force for the prosperity of the country's economy and

maintains the operational system because every production, transportation and factory industry requires the development of products from crude oil so that it can run smoothly (Arouri & Rault, 2012). Crude oil West Texas Intermediate was US\$58.85 per barrel. Crude oil prices are quite volatile, where the lowest point for WTI crude oil prices in the period 2010 to 2019 was 30.37 in February 2016, and the highest point occurred in April 2011 with a price of 109.75 US dollars per barrel. During this period too, there was a drastic decline in world crude oil prices from July 2014 to January 2015, where in July 2014 it was at 101.85 and continued to fall to 49.35 in January 2015. This was due to abundant supplies exacerbated by strong production from OPEC and the United States. Prices have fallen especially since December 4, when the Organization of the Petroleum Exporting Countries (OPEC) decided against limiting production, as its members struggled to maintain market share (Tempo, 2016).

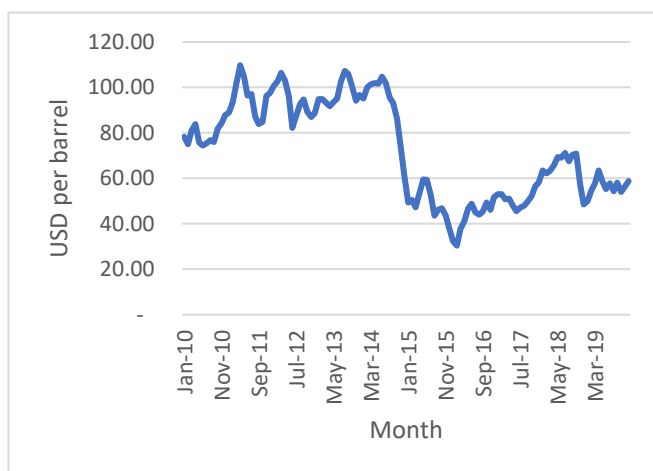


Figure 3: Oil price WTI in 2010-2019

Source: Investing.com

There have been several studies regarding the correlation between crude oil prices and stock indexes in the last decade. Research from Alzyoud, Waang and Basso (2018) shows that there is no cointegration between COP, exchange rates and returns stock market. Regression analysis shows that the COP and the exchange rate, and their variations have a positive and significant effect on returns Canadian stock market. In addition, research from Anyalechi, Ezeaku, Onwumere and Okereke (2019) shows that changes in oil prices have a positive but not significant impact on stock returns in both the long and short term. On the other hand, research from Arouri and Rault (2010) shows that there is a negative relationship between oil prices and stock prices in the Saudi Arabian stock market. Therefore, this study intends to evaluate the

relationship between macroeconomic variables and Islamic and conventional stock indices regarding whether these macroeconomic variables have a positive or negative impact on each other.

Data And Method

This study uses the quantitative Autoregressive Distributed Lag (ARDL) method, followed by the estimation of the Error Correction Model (ECM), if there is cointegration. Previously, the available data would go through several tests, namely the unit root (stationarity) and the cointegration test. The time period used in this study is January 2010 to December 2019. The data used is in the form of monthly data taken from the Indonesia Stock Exchange, the Central Bureau of Statistics (BPS), and Yahoo Finance.

LITERATURE REVIEW

Shares are defined as proof or certificate of ownership of a person or an entity in the company that issues the securities, which can also be interpreted as the participation of investors as investors in a company, so that they have claims on the income and assets of the company (Harsonon 2013). Stocks are one of the most popular forms of investment. Shares are issued by companies in order to raise capital. Shares are in the form of securities proof of deposit of funds from investors to the company. Companies that issue shares to be owned by the public are called public companies (Go Public). The share trading mechanism is regulated by the Indonesia Stock Exchange (IDX) under the supervision of the OJK (Financial Services Authority). In investing, especially in stocks, there are two important things, namely the rate of return or return and risk. Investors generally want maximum return with minimum risk (Nastiti & Suharsono, 2012).

According to Rivai & Buchari (2013), in general, there are two categories of shares that are generally known in stock trading, namely preferred shares and ordinary shares. Preference shares have claim rights to earnings and assets in the companies where they invest funds, but they cannot have voting rights in selecting directors and making company decisions. And if the company goes bankrupt, preferred stockholders' claims will take precedence in payments over common stockholders. While ordinary shares have voting rights in the election of directors and decisions relating to the company. The dividends received by common stockholders may be greater than those of preferred. Several studies related to the influence of macroeconomic variables on the Sharia stock index in Indonesia have been carried out by several

researchers, for example [Nugroho & Rusydiana \(2019\)](#), [Prakoso \(2022\)](#), [Sakti & Harun \(2013\)](#), and [Rusydiana & Prakoso \(2021\)](#).

Islamic Stock

Islamic stocks are investment activities in the form of equity participation in companies whose activities do not violate sharia principles ([Heykal, 2012](#)). According to [Soemitra \(2009\)](#) Islamic stocks are shares issued by a company that has fulfilled the following conditions:

1. The type of business, product, goods or services provided and the contracts and management of companies that issue shares (issuers) or public companies that issue sharia shares must not conflict with sharia principles. Types of business activities that conflict with sharia principles include:
 - a. Conventional financial institutions (ribawi), including conventional banking and insurance;
 - b. Producers, distributors, and/providers of goods or services that damage morale and are harmful;
 - c. Conduct transactions with issuers where at the time of the transaction the company's debt level to ribawi financial institutions is more dominant than its capital;
 - d. Issuers or public companies that issue sharia shares are required to sign and comply with sharia-compliant contract terms for the issued sharia shares.
2. Issuers or public companies that issue sharia shares must guarantee that their business activities comply with sharia principles (DSN Fatwa No. 40/2003).

Stock Price Index

Stock price index is an indicator that shows stock price movements. The index functions as a trend indicator from the stock market that describes market conditions in certain conditions, both in active and sluggish conditions, the movement of the index is an important indicator for investors to determine whether they will sell, hold, or buy a certain number of shares ([Masodah, et al., 2012](#)).

In general, almost all countries have their own stock index. There are even several countries that have more than one stock index, such as in Indonesia which has the Jakarta Islamic Index (JII), as well as the Indonesian Sharia Stock Index (ISSI). The United States owns the Dow Jones, the Dow Jones Islamic Market US (IMUS), and the NASDAQ.

Indonesia Composite Index (IHSG)

The Jakarta Composite Index or JSX Composite is a type of index on the Indonesia Stock Exchange. JCI is to measure the value of the performance of all shares

listed on a stock exchange by using all shares listed on the stock exchange as a component of index calculation. JCI is used to determine the development and general situation of the capital market, not the situation of a particular company. This index includes price movements of all ordinary shares and preferred shares listed on the IDX.

According to [Anoraga & Pakarti \(2001\)](#), the JCI is an index that shows the movement of general stock prices listed on the stock exchange which is a reference for the development of activities in the capital market. JCI can be used to assess the general market situation or measure whether stock prices have increased or decreased. JCI also includes all stock prices listed on the stock exchange.

Jakarta Islamic Index (JII)

The Jakarta Islamic Index (JII) is one of the sharia stock indices in Indonesia which is used as a benchmark for the performance of sharia stocks. The Jakarta Islamic Index was introduced by the IDX and Danareksa Investment Management (DIM) on July 3, 2000 which aims to provide guidance to investors who wish to invest their funds in a sharia manner. According to [Hidayat \(2011\)](#), the shares included in the 30 JII shares are stocks that meet the criteria, namely the main type of business does not conflict with sharia principles and has been recorded for more than three months (unless included in the ten large capitalizations), based on annual financial reports or middle year has a maximum ratio of liabilities to assets of 90 percent, included in 60 shares from the composition of shares based on the order of the largest average market capitalization over the past year, then entered into 30 shares in order based on the average liquidity level of the regular trading value for one year last year.

World Crude Oil Price

World Crude Oil Price is an exchange rate that can be equated with money or other goods for the benefits derived from an item or service for a person or group at a certain time and at a certain place. Crude oil (crude oil) is a commodity and energy source that is needed for the growth of a country. Crude oil can be processed into energy sources, such as Liquefied Petroleum Gas (LPG), gasoline, diesel, lubricating oil, fuel oil and others.

The World Crude Oil Price (Crude Oil Price) is measured from the spot price of the world oil market, generally used as a standard is West Texas Intermediate and Brent. World oil traded on West Texas Intermediate (WTI) is a high quality crude oil. This type of oil is very

suitable to be used as fuel, this causes the price of this oil to be used as a benchmark for world oil trade.

Autoregressive Distributed Lag (ARDL)

This study uses the estimation method with Autoregressive Distributed Lag (ARDL) analysis variables time series. The ARDL method was first introduced by Pesaran and Shin (1999) with a cointegration test approach with the Bound Test Cointegration. The cointegration test in this method is carried out by comparing the F-statistic values with the F-table values that have been compiled by Pesaran and Shin (1999).

Some of the literature on cointegration tests that can be used, such as Johansen, Engel-Granger, Phillips and Hansen, Phillips and Loretan, require the estimated variables to be integrated at the same level at order I(1) or first difference. To overcome this, Pesaran and Shin (1997) developed the ARDL method using Bound Testing Cointegration. According to Fosu and Magnus (2006), the ARDL method has several advantages compared to other econometric methods, namely:

1. The cointegration test performed is simpler than the Johansen-Juselius cointegration test. This is because the use of cointegration bound testing is sufficient to test the estimated cointegration using OLS when the lag of the model has been identified.
2. Procedure bounds test does not require unit root testing on the variables used in the study. This cointegration test can be applied to models where all variables are stationary at I (0), I (1), or the integration of both (Pesaran et al., 2001).
3. Testing with ARDL is relatively more efficient for small and limited data samples.

Estimation and identification of the ARDL model can use Ordinary Least Square (OLS) if the ARDL order has been determined (Pesaran, Shin, & Smith, 2001). Furthermore, OLS can be used if some binding OLS assumptions on the related econometric estimates are met. An estimator that meets the Best Linear Unbiased Estimator (BLUE) is a requirement for an OLS estimation model to be used as a basis for analysis. While several problems in violation of OLS assumptions include: multicollinearity problems, heteroscedasticity problems, autocorrelation, and functional specification errors.

The steps in testing ARDL in this study are as follows (Dilla, 2014):

1. Stationarity test was carried out with the Phillip Perron (PP) Test. The test hypothesis of the PP Test is as follows:

H0: $\delta = 1$; there is a unit root/not stationary

H1: $\delta < 1$; no unit root/stationary

The criterion for the test results is to compare the value of the PP t-statistic with the MacKinnon. If the value of the PP t-statistic is smaller than the MacKinnon, the test result is a rejection of H0 which states that the data is stationary at the level. If the test results show that the data used is not stationary at degree I (0) or level, then there are two possible ARDL models to be used. For cointegrated data, the ARDL for Cointegration, while for data without cointegration, the ARDL first difference.

2. To find out whether there is a cointegration relationship between variables that are not stationary, a Bounds Test Cointegration. Equation estimation is carried out using OLS by applying the F test which is intended to determine the existence of a long-term relationship (cointegration) between variables. The F test is used to see the joint test for long-term coefficients. The hypotheses tested are:

H0: $\delta_1 = \delta_2 = 0$; no cointegration

H1: $\delta_1 \neq \delta_2 \neq 0$; there is cointegration

The criterion for the test results is to compare the value of the F-Statistics with the critical values that have been compiled in the table by Pesaran and Shin (1999). In the ARDL Bounds Test there are two asymptotically critical limit values for testing cointegration. The lowest critical value (lower critical value) assumes the regressor is integrated in I (0) while the highest critical value (upper critical value) assumes the regressor is integrated in I (1). If the F-statistic is above the highest critical value, then the null hypothesis about no cointegration or no long-term relationship is rejected. Conversely, if the F-statistic is below the lowest critical value then the null hypothesis is not rejected. If the F-statistic is between the lowest and highest critical values, then there is no conclusion (Pesaran et al., 2001).

DATA AND METHODOLOGY

The data used in this study is secondary data in the form of time series obtained from several sources such as the Indonesia Stock Exchange, the Central Bureau of Statistics (BPS), and Yahoo Finance. All data starts from the period January 2010 to December 2019. As the dependent variable, the Jakarta Islamic Index (JII) is an Islamic stock index which is a composite of 30 Islamic stocks that have the highest level of liquidity. In addition, the Composite Stock Price Index (IHSG) is a composite stock index of all issuers available on the Indonesia Stock Exchange (IDX). Furthermore, the independent variables used are Singapore stock index (STI), United States S&P 500 stock index (SP), inflation (INF), Long-term Interest Yield (LIR), Rupiah exchange rate against USD (EX),

Industrial Production Index (IPI), WTI World Crude Oil Price (COP), and money supply (M2).

RESULT AND ANALYSIS

Stationarity Test

The test method used to test the stationarity of the data in this study is the ADF (Augmented Dickey Fuller) and Phillips-Perron using a five percent level of significance. If the t-ADF and t-PP values are less than the MacKinnon, it can be concluded that the data used is stationary (does not contain unit roots).

The unit roots test is carried out at the level up to the first difference. In the ADF test, the variables that reach stationary at the levels are LN_IDX and LN_IPI. After doing the first difference, all data is stationary at the five percent level of significance. This means that the data used in this study are integrated at order one or can be abbreviated as I (1). Meanwhile, in the Phillips Perron only the LN_IPI variable was stationary at the level, so that the variables used were only stationary at the first difference. The results of the unit root test can be seen in Table 1.

Table 1: Stationarity Test

Variable	ADF value		Phillips-Perron value	
	Level	1st Difference	Level	1st Difference
LN_JII	-3.177394	-11.32755	-3.091177	-11.40112
LN_IDX	-4.195763	-8.201633	-3.224484	-8.239732
INF	-10.14108	-10.59563	-7.301972	-21.99970
LIR	-2.580496	-8.556973	-1.952289	-8.494299
LN_COP	-2.489252	-7.773195	-2.005571	-7.426494
LN_SP	-2.858846	-8.815802	-2.948839	-8.776759
LN_EX	-2.358280	-8.703402	-2.166193	-8.655385
LN_IPI	-10.52651	-12.78234	-10.51928	-22.96851
LN_M2	-2.401181	-11.36489	-3.319532	-12.24385
LN_STI	-3.318095	-12.79096	-3.258199	-12.91301

Cointegration Test

To determine the existence of cointegration in the model, that is by using the Bounds Testing Cointegration cointegration test method. The level of cointegration confidence is assessed based on critical value bounds (Pesaran et al., 2001). If the F-statistic value is below the

lowest critical value (lower bound), it can be concluded that there is no cointegration in the model. If the value of the F-statistic is above the highest critical value (upper limit) then cointegration can occur in the model. However, if the F-statistic is between the lower and upper limits, then the results cannot be concluded.

Table 2: Bounds Test ARDL

Model	F-Statistic	Result
Model 1 (JII)	1.428808	Not Cointegrated
Model 2 (IHSG)	3.446303	Cointegrated
Significance	I(0) Bound	I(1) Bound
10%	1.85	2.85
5%	2.11	3.15
1%	2.62	3.77

Based on the cointegration test results for both models, only the JCI model is cointegrated in the long term. This means that the estimation of the JCI model was carried out using the Error Correction Model (ECM)

method, while the JII model, which was not cointegrated, was estimated using the ARDL first difference.

Optimum Lag

Selection of the best ARDL model with optimal lag combination, selected based on Akaike Information

Criteria (AIC). The optimum lag test results show that the maximum lag that can be estimated by ARDL is lag 2.

Table 3: ARDL Optimum Lag

Model	Lag Optimum
Model 1 (JII)	1, 1, 0, 0, 0, 0, 0, 1, 0
Model 2 (IHSG)	2, 2, 0, 0, 1, 0, 1, 0, 1

Model Estimation

Following are the estimation results for both models (JII and JCI). In accordance with the results of the Bounds Test, only the JCI model is cointegrated into the

long run, so that the ECM estimation is only carried out by the JCI model, while in the JII model, ARDL first difference estimation is carried out.

Table 4: Short-Term Estimation

Variable	Coefficient	
	Model 1 (JII)	Model 2 (IHSG)
D(LN_JII(-1))	-0.217664*	
D(LN_IDX(-1))		0.249946***
D(INF)	-0.009738	-0.002440
D(INF(-1))	-0.009288	
D(LIR)	-0.015533	0.000365
D(LN_COP)	-0.068519	-0.578131***
D(LN_EX)	-1.102748***	0.026273
D(LN_IPI)	0.052123	0.151079
D(LN_M2)	0.050232	0.075470
D(LN_SP)	0.087162	0.376284***
D(LN_SP(-1))	0.242328*	
D(LN_STI)	0.364905***	-0.282413***

***), **), and *) significant at 1%, 5%, and 10%

Based on the short-term estimation results, it is known that in model 1 (JII) there are four significant variables, namely the self-variable (LN_JII) at lag 1 which has a significant effect on the ten percent significance level with a coefficient of -0.217. Then the exchange rate variable (LN_EX) which has a significant effect on the one percent significance level with a coefficient of -1.102, the US stock index variable (LN_SP) in the 1st lag which has a significant effect on the ten percent significance level with a coefficient of 0.242. In addition, the Singapore stock index variable (LN_STI) has a significant effect on the one percent significance level with a coefficient of 0.364.

Next, the short-term estimation results in model 2 (JCI) show four significant variables, namely the self-variable (LN_IDX) at lag 1 which has a significant effect on the one percent significance level with a coefficient of -0.249. Then, the variable crude oil price (LN_COP) which has a significant effect on the one percent significance level with a coefficient of -0.578, the US stock index variable (LN_SP) which has a significant effect on the one percent significance level with a coefficient of 0.376. In addition, the Singapore stock index variable (LN_STI) has a significant effect on the one percent significance level with a coefficient of -0.282.

Table 5: Long-Term Estimation of IHSG

Variables	Coefficient	Prob.
INF	0.023453	0.3777
LIR	0.077780	0.4362
LN_COP	-0.010210	0.8003
LN_EX	-0.579471	0.0018**
LN_IPI	-0.026705	0.9067
LN_M2	0.856793	0.0000*
LN_SP	0.195479	0.1710
LN_STI	0.550490	0.0017**
C	-3.577436	0.1183

***), **), and *) significant at 1%, 5%, and 10%

The long-term estimation results for the JCI model are shown in Table 5. The results show that the exchange rate (LN_EX), money supply (LN_M2), and Singapore stock index (LN_STI) variables have a significant effect on the JCI in the long run, with a coefficient of -0.579, respectively. 0.856 and 0.55 with a P- significant.

DISCUSSION

The findings of this study indicate that in the long run, the relationship between the exchange rate and the JII index is negative, in accordance with the theory of the stock-approach (Branson, 1983; Frankel, 1983). Model stock-approach it is based on the assumption that the exchange rate is determined by the supply and demand for financial assets, such as equities and bonds. These models can be divided into portfolio balance models and monetary models. The portfolio balance model shows that there is a negative relationship between the exchange rate and stock prices (Frankel, 1983; Branson and Henderson, 1985). In this model, individuals hold both domestic and foreign assets, including currencies in their portfolios. Exchange rates play the role of balancing the demand and supply of assets. Increases in domestic stock prices cause individuals to demand more domestic assets. To buy more domestic assets, local investors sell foreign assets causing local currency to appreciate. As a result, the relationship between stock prices and exchange rates becomes negative.

Furthermore, the results of the research above show that the crude oil price (COP) variable has a negative effect on the JCI. These results are consistent with research by Park and Ratti (2008) who analyzed the effect of oil price movements on the stock market in the United States and thirteen European countries between 1986 and 2005. They revealed that oil price fluctuations had a negative impact on the stock market. Theoretically, an increase in oil prices can increase income for oil-exporting

countries because it is expected to sustain foreign exchange earnings and build reserves in the short term. However, for oil importers such as Indonesia, rising oil prices may affect fiscal policy which tends to weigh down, which limits the government's ability to finance its hefty import bills as well as meet other international obligations. The consequences can be detrimental to economic growth arising from increasing domestic production costs and decreasing aggregate demand (Onyeye et al., 2020).

CONCLUSIONS AND RECOMMENDATIONS

Based on the results of research that has been done regarding the influence of macroeconomic variables on the two research models; JII and JCI, several conclusions were obtained, namely:

- There is no cointegration of the long-term relationship on the Jakarta Islamic Index (JII) index, meanwhile, cointegration occurs in the JII model in the JII model, so the estimation in these two models uses the ARDL first difference for the JII model, and the ECM method for the JCI model.
- In the short term, the US S&P 500 and Singapore STI stock indices significantly affect the JII and JCI movements. In addition, the exchange rate significantly affects JII, and the crude oil price (COP) significantly affects the JCI.
- In the long term, the money supply, exchange rate and STI Singapore stock price index significantly affect the JCI.

The recommendations that the author can give are:

- For investors, it is suggested to be more critical in analyzing the factors that influence the movement of JII and JCI. Investors can seek information related to external factors that affect market conditions, such as macroeconomic variables. This

information can help investors make investment decisions and predict the right time to sell or buy shares on the stock exchange.

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