



The Indonesia Stock Exchange and Its Dynamics: An Analysis of the Effect of Macroeconomic Variables

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ABSTRACT

The relationship among some macroeconomic variables such as the exchange rate, world oil prices, and international capital market index with the Indonesian stock market (Indonesia Stock Exchange/IDX)'s dynamics still interesting to study. Some studies still found inconsistent results, and its dependence on the dynamics of the international capital market and financial market, especially when there was turmoil in the international stock markets, such as the economic crisis in America. Those conditions made it interesting to examine whether there are influences from the Dow Jones index, the Rupiah exchange rate toward the US Dollar, and world oil prices toward the JCI. Therefore, this study uses a period of data that includes the period of data used by several previous studies that examined the JCI as the object, namely data for the period of 2005-2016. This research aims to study the effect of macroeconomic variables: Dow Jones Industrial Average, USD/IDR, and World Crude Oil Price towards the Jakarta Composite Index (JCI) during the period of 2005-2016. Using the daily closing prices of Dow Jones Industrial Average (JCI), USD/IDR, World Crude Oil Price, and Jakarta Composite Index, the GARCH (1,1) analysis showed that Dow Jones Industrial Average and World crude oil price had a positive significant effect on the JCI while USD/IDR had a negative significant effect on JCI. The findings implied the importance to consider macroeconomic variables when investing in the Indonesia Stock Exchange.

INTRODUCTION

Capital market is closely related to the domestic economy. The healthier the capital market, the healthier the country's economy and vice versa. It is because almost all industries or companies in a country are represented by their capital markets (Crockett, 1997). The capital market is selected by many companies as alternative funding because the funds originating from investors are long-term and unlimited. Besides, the funds are not only used by the company to increase working capital and business development, but it can also be used for long-term investment projects. The most dominant long-term instruments in the capital market are stocks.

The Jakarta Composite Index or commonly referred to as the JCI is generally used by investors to observe movements in stock prices listed on the Indonesia Stock Exchange (IDX), so that investors can understand how the condition of the Indonesian capital market is, whether in bearish or bullish (active) condition. It is the capital market conditions that will influence investors' perceptions of investing so that it influences the movement of stock prices (Crockett, 1997).

Cheng et al. (1997) study revealed that fluctuating stock movements are a form of response from investors to information entering the market, such as the exchange rate and the United States (US) stock market index which are increasingly integrated with other countries' stock markets. Abdalla and Murinde (1997) also stated that the changes that occur in stock prices are influenced by the movement of the exchange rate. However, in another study by Kilian (2015) and Valadkhani (2006) discussing variables that can affect stock prices, they reveal that world oil prices have proven to have a significant effect on stock indexes in the US and Thailand. Fischel (1989) and Robiyanto (2018a) stated that one commodity whose price movements can affect stock prices is oil, given that oil is one of the main energy sources used by industry.

Previous research by Cheng et al. (1997) only discussed exchange rates and the US stock market index which affect stock prices. In addition, Abdalla and Murinde (1997) only examined exchange rate variables in their influence on stock price movements and had proven to be influential. While the effect of oil prices on stock prices on researches by Kilian (2015) and Valadkhani (2006) was carried out separately with the research object of the stock markets of the United States and Thailand. This study attempts to integrate the independent variables from the four studies, namely the Dow Jones index, the USD/IDR exchange rate, and the world crude oil price with the JCI as the research object of research.

The Dow Jones Index is one of the main and oldest indices in the United States (US) that reflects its economic performance (Robiyanto, 2018b). Good economic performance has made Indonesia's economic growth increased, reflected in the JCI, whether through exports, investment through the capital market or direct investment. Based on data from the period of 2000-2015, the US was the third largest export destination for Indonesia after Japan and China with an average export value of 14,395.98 million US dollars per year (www.bps.go.id). However, the US economy was the strongest in the world with a contribution of 20-30% of the world's economic turnover and has a Gross Domestic Product (GDP) of 20% of world GDP in 2007 (Sihono, 2008). With its economic strength, the economic turmoil occurred in the US would have an impact on many countries, resulting in having a greater effect on Indonesia's economy compared to Japan's and China's. This was supported by Adas and Tussupova (2016); Robiyanto (2018b) that the financial crisis in America in 2008 had an impact on the American, Chinese, Indian, British, Japanese, Malaysian and Indonesian capital markets.

Meanwhile, the exchange rate becomes an inseparable part of economic activity because it is a means of transaction in international trade. According to Joesoef (2008), USD/IDR is the amount of Rupiah currency needed to have one USD currency. The US dollar is the currency which is mostly used by countries in the world in international trade. Gumilang et al. (2014) explained that the movement of the Rupiah exchange rate toward the US Dollar can affect the JCI movement. When the Rupiah has depreciated toward the US Dollar, it will have an impact on the increase in the amount of Rupiah needed by the issuer to pay off foreign debt and the cost of imported raw mate-

rials which can cause the issuer's profit to decrease. The decrease in earnings of issuers will reduce investors' interest in investing their capital so that it will affect the stock price of the issuer and ultimately will affect the JCI.

Another factor that can affect the JCI is world oil prices. Oil cannot be separated from the economic activity of a country considering that oil is the main fuel source. Based on sources from the US Energy Information Administration, Indonesia is an oil importer since 2004. Robiyanto (2018a) stated that there is a negative potential for increasing oil prices on the Indonesian capital market. This is due to Indonesia's position as an oil importer so that increasing oil prices will have a negative impact on macroeconomic stability. Furthermore, Gumilang et al. (2014) explained that increasing oil prices will cause the issuer's operating costs to increase. Increased operating costs will increase the selling price of goods which allows a decrease in sales by the issuer so that the issuer's profit will decrease. This will certainly reduce the interest of investors in investing their capital which will ultimately affect their stock prices and the JCI in general.

These variables experienced turmoil during the crisis in the US known as the subprime-mortgage crisis or the global financial crisis which also experienced its peak in September 2008. Putra et al. (2018) revealed that the subprime-mortgage crisis resulted in its main stock indexes, namely the Dow Jones index and the index in Europe and Asia including Indonesia experiencing deep enough corrections. In addition, the crisis also had a direct impact on countries that made America the largest export market, such as Indonesia, China, Japan, and Germany. As a result, the Rupiah exchange rate toward the US Dollar had depreciated quite significantly. Conditions that occurred due to the subprime-mortgage crisis had a negative impact on the performance of the company and the economy in general, making the investors' confidence decreased, as indicated by selling actions. The weakening world economy at that time also caused world demand for oil to decline, resulting in a fall in oil prices. This was followed by the fall of the world capital market including Indonesia because the weakening economy had an impact on the decline in investor confidence which was indicated by selling action.

There have been several previous studies on the influence of the Dow Jones index, USD/IDR exchange rates, and world oil prices on the JCI. Research by Marjohan (2015) on the effect of the Dow Jones index (DJIA) on the Composite Stock Price Index (CSPI) using the monthly closing data for 2008-2013 with multiple linear regression testing proved a positive influence. This was because the US is Indonesia's main export destination, therefore, changes in economic conditions of the US reflected in the Dow Jones index will have an impact on the Indonesian economy which can also be seen in the JCI. While the results of different studies found by Lie (2012) using the monthly closing data in 2005-2010 and Vector Auto-regression (VAR) model proved a negative influence of the Dow Jones index on the JCI, allegedly due to the negative influence of investment changes by investors.

Research on the influence of the USD/IDR exchange rate on stock prices has also been widely done on the JCI object. Gumilang et al. (2014) used monthly closing data for 2009-2013 with multiple linear regression test proving that the influence of the USD/IDR exchange rate on JCI was negative. The depreciation of the USD/IDR exchange rate resulted in an increase in the cost of imported raw materials and issuer's foreign debt so that investors' interest decreased due to the risk of a decrease in profits from the issuer. While the results of research by Haryogo (2013) who used monthly closure data in 2005-2011 and multiple linear regression test found no significant effect of the USD/IDR exchange rate on the JCI. This was due to the role of the Central Bank to regulate and maintain the stability of the exchange rate so that in a certain time, Bank Indonesia (BI) could sterilize the foreign exchange market especially when there was an excessive exchange rate fluctuation.

While research on the effect of oil prices on stock prices had been done by Park and Ratti (2008) on the Norwegian stock market and Robiyanto (2018a) on the ASEAN stock markets. The data used by Park and Ratti (2008) was the monthly closing data of 1986-2005 with Vector Auto-

regression model, concluding that there was an influence with a positive direction. Norway as an oil exporter was the reason for this positive influence. On the other hand, Cong, Wei, Jiao, and Fan (2008) examined the Chinese stock market using monthly closing data in 1996-2007 with Vector Auto-regression model. It showed that changes in oil prices had no effect on the stock price index in China. The increase in oil prices will cause the manufacturing index to weaken, while the mining and petrochemical indices strengthen and vice versa.

The same research results were also found by Tjandrasa and Sutjiati (2016), although the research object was the Indonesian capital market. He also used the monthly closing data in 2012-2016 and multiple linear regression testing. He concluded that world oil prices had no effect on the JCI. This happened because the rise and fall of world oil prices did not directly affect the industry, but the government's policy in determining domestic oil prices which ultimately affected the industry. The results of Tjandrasa and Sutjiati (2016) were in contrast to the results of Gumilang et al. (2014) who used monthly closing data for 2009-2013 and multiple linear regression testing. It indicated that oil prices had a negative effect on the JCI. Rising world oil prices had caused the issuer's operating costs to rise. In the end, it had an impact on the company's profit at risk of decreasing, so that it would reduce investors' interest and tend to sell actions which in turn lead to a decrease in stock prices. While the results of different studies were also found by Handiani (2014) who used monthly closing data from 2008-2013 with multiple regression analysis techniques, proving that there was a positive effect of crude oil prices on the JCI. The increase in the price of crude oil resulted in increased net profit from mining companies, so that it would attract investors to invest in mining companies that would eventually push the JCI up.

Based on the results of the previous studies that have been described previously, there are results that were inconsistent or in contrast to each other. In addition, there was a relation among independent variables in this study with the JCI when there was turmoil in the capital markets, such as the economic crisis in the United States, making it interesting to examine whether there are influences from the Dow Jones index, the Rupiah exchange rate toward the US Dollar, and world oil prices toward the JCI. The difference in the results of these studies can be caused by differences in data periods and differences in the test tool used. Therefore, to fill this gap, this study uses a period of data that includes the period of data used by several previous studies that examined the JCI as the object, namely data for the period of 2005-2016. The study used daily closing data to be more capable in explaining the results of research which was different from the data used by Cong et al. (2008); Gumilang et al. (2014); Handiani (2014); Haryogo (2013); Marjohan (2015); Park and Ratti (2008); Tjandrasa and Sutjiati (2016) which used monthly closing data. While the test tool used by previous researchers such as Gumilang et al. (2014); Handiani (2014); Haryogo (2013); Marjohan (2015); Tjandrasa and Sutjiati (2016) was multiple linear regression that must meet the classical assumption test including normality test. On the other hand, time series data is often abnormal and cannot be normalized. Based on those reasons, this study used a different analytical technique named Generalized Autoregressive Conditional Heteroscedasticity or GARCH (Bollerslev, 1986). This study is expected to provide information for local and foreign investors about what factors can influence and how they affect the JCI so that investors can use the right information in predicting the JCI movement fluctuations needed to make the right decisions in investing in stocks listed in the Indonesia Stock Exchange.

1. LITERATURE REVIEW

1.1. Capital Market Integration and Market Reaction

Capital market liberalization causes capital flows from investors to enter the capital markets of other countries or in other words, foreign investors can invest in the domestic market. This condition is certainly beneficial for investors to reduce the risk level through international diversification (Wong et al., 2004). Basically, international diversification is not much different from domestic

diversification, aiming to reduce the risk level in the portfolio. The difference lies in the object of diversification. Domestic diversification refers to the assets in a market, so the concern is the correlation between stocks on the domestic stock exchange (Robiyanto, 2018b). While the international diversification refers to assets spread in more than one market, so the concern is the correlation of price movements between stock exchanges in countries in the world or often referred to as international capital market integration (Wahyudi et al., 2018).

Click and Plummer (2005) defined capital market integration as a correlation between two or more stock price index movement, which means that a turmoil in a stock price index fluctuation is followed by a change in the other stock price index or often called a contagion effect. Wibowo (2012) stated that capital market integration cannot be separated from economic conditions. The more globalized the economy, a country can have a trade or economic relations with other countries. This makes the economy between countries in the world is increasingly integrated or related. Economic crises such as the monetary crisis in America in 2008 could cause economic crises in many countries which were also followed by the collapse of the world capital market. This happened because investors reacted to the weakening of a country's economy by selling off shares held in the country's capital market.

If the domestic capital market is integrated with international capital markets, then the benefits of international diversification are meaningless to investors. This happens because of the contagion effect which means that the turmoil in a capital market will have the same impact on other integrated capital markets (Wong et al., 2004). Therefore, it has an impact on the return and the risk level inherent in the portfolio. In the end, the goal of international diversification, which is to minimize risks that cannot be reduced at the domestic level, cannot be realized. This situation ultimately affects the profit level obtained by investors from its portfolio. This is different from the segmented capital market where a capital market is not affected by other capital markets, making the objectives of international diversification can be realized (Wahyudi et al., 2018).

1.2 The Influence of the Dow Jones Industrial Index (DJIA) on the Jakarta Composite Index (JCI)

The US economy is the most powerful economy in the world with a contribution of 20-30% of the world's economic turnover and has a Gross Domestic Product (GDP) of 20% of world GDP in 2007. This makes the US economy has a large influence on the economy of other countries (Sihono, 2008). This is inseparable from the globalization of the economy where economic activity can be executed between countries without any limitation to make the inter-state economy interrelated. An event that occurs in a country's economy can have a positive or negative influence and can be recognized quickly by other countries (Marjohan, 2015). Statement from Sihono (2008) and Marjohan (2015) is supported by researches from Adas and Tussupova (2016); Majid and Kassim (2009); Robiyanto (2018b) saying that the subprime-mortgage crisis in the US in 2008 had an impact on the US, Chinese, Indian, British, Japanese, Malaysian and Indonesian capital markets. The movement of a stock index is strongly influenced by investors' expectations of a country's economic condition. The global financial crisis in 2008 was one of the effects that could affect the other countries' economy, thus affecting the size of the capital invested in the stock market.

A statement from Majid and Kassim (2009); Marjohan (2015); Sihono (2008) is also supported by Venska et al. (2014) which states that the United States is a world economic power. The fact that there is a globalization of the economy, the turmoil experiences the US economy will affect the economies of many countries. This especially happens to the economy which becomes a trading partner of the US including Indonesia which makes the US one of the main destinations in its export activities. There are three major stock indices in the US namely the Dow Jones index, the Nasdaq Composite, and the Standard & Poor's 500. However, according to Robiyanto (2018b); Seth and Sharma (2015), the US economic condition is reflected in its main stock index, the Dow

Jones index. As one of Indonesia's main export destinations, when the Dow Jones index strengthened, it means that the US economic condition is in good condition. This encourages Indonesia's economic conditions reflected in the JCI, both through exports, direct investment and investment in capital markets.

Several studies have examined the influence of the Dow Jones index on the JCI, such as studies by Majid and Kassim (2009); Robiyanto (2018b); Venska et al. (2014) which found that there was a positive influence on the Dow Jones index on the JCI. It indicated that when the Dow Jones index strengthened, it would be followed by the JCI which also experienced a strengthening and vice versa.

Based on the description above, the first hypothesis can be formulated as follows:

H₁: The Dow Jones Industrial Index has a positive effect on the JCI.

1.3 The Influence of USD/IDR Exchange Rate on the JCI

Joesoef (2008) defined exchange rate as the currency price of a country stated in a currency of another country or in this case the USD/IDR is defined as the amount of Rupiah needed to get 1 USD. The movement of the Rupiah toward the US Dollar is influenced by demand and supply. If the demand for the Rupiah is lower than the supply of the Rupiah, it will cause the Rupiah to depreciate or weaken toward the US Dollar. The results of research by Abdalla and Murinde (1997) proved that there was an influence of exchange rates on stock prices in the Philippines, South Korea, Pakistan, and India.

According to Patel (2012), depreciation of domestic currency toward foreign currencies can mean both positive and negative. The domestic currency that depreciates toward foreign currencies can increase exports so that it will drive stock prices or a positive influence. However, on the other hand, it can increase the cost of imported raw materials as well as the amount of Rupiah needed by the issuer to pay off foreign debt which can reduce its profit, resulting in a decline in stock prices or a negative influence. Patel (2012) is supported by Abduh and Surur (2013) and Yogaswari et al. (2012) which found that the JCI was negatively affected by the exchange rate of the Rupiah toward the US Dollar. The depreciation of the Rupiah toward the US Dollar reduces investors' confidence in the issuers' performance because it can increase the cost of imported raw materials and the amount of Rupiah to pay for its foreign debt. Handiani (2014) revealed that the depreciation of the Rupiah toward the US Dollar is caused by a trade balance that deficits or imports exceed exports. The number of products from imports means that the demand for the US Dollar is increasing so that the Rupiah depreciates. Joesoef (2008) added that the weakening of the Rupiah exchange rate toward the US Dollar reflects Indonesia's economic fundamentals that are not in good condition, which is a risk for investors. As a result, investors tend to wait and see and sell so that the JCI experiences corrections.

Various studies have been carried out such as researches by Abduh and Surur (2013); Yogaswari et al. (2012) which found that the exchange rate of the Rupiah toward the US Dollar negatively affected the JCI. This indicated that when the Rupiah exchange rate depreciated toward the US Dollar, the JCI experienced a decrease and vice versa.

Based on the description above, the second hypothesis can be formulated as follows:

H₂: The USD/IDR exchange rate has a negative effect on the JCI.

1.4 The Influence of World Oil Price on the JCI

There are two oil prices used in the international trade, namely World Texas Intermediate (WTI) which is the benchmark for oil prices in the United States and Brent Crude Oil which is the bench-

mark for oil prices in Europe (Filis et al., 2011; Robiyanto, 2018a). However, World Texas Intermediate is often used as the main reference in international oil prices because it has high quality with lower sulfur content, so it is very well used as gasoline (Gumilang et al., 2014).

Robiyanto (2018a) stated that oil price movements that experience turmoil have an influence on the economy in general and the capital market in particular. The price of oil that has increased or decreased can have a positive or negative effect. For oil exporting countries, increased oil prices are such an advantage or have a positive impact. In contrast, for oil importing countries, increased oil prices are such a loss or have a negative impact.

Research by Abdelaziz et al. (2008) examined the effect of oil price movements on the capital markets of Oman, Saudi Arabia, Kuwait and Egypt which are oil exporting countries. The results of the study concluded that when oil prices increased, at the same time, the stock price index of each country's capital market experienced an increase or the movement in oil prices had a positive effect on each of the country's capital markets. While the results of a study by Robiyanto (2018a) concluded that increased oil prices had a potential negative influence on the Indonesian capital market. This was because Indonesia is an oil importer country. So that increased oil prices will affect Indonesia's macroeconomic stability as oil is the main energy source used by industry in Indonesia. In addition, according to Gumilang et al. (2014), the increase in oil prices will also increase the operating costs of issuers, considering various operational activities use oil as fuel. Increased operating costs will certainly increase the selling price of goods which allows a decrease in sales by the issuer, so it will reduce its profit. This situation creates negative perceptions by investors which cause the issuer's share price to decrease.

Based on the description above, the third hypothesis can be formulated as follows:

H₃: World oil prices have a negative effect on the JCI.

2. METHODOLOGY

2.1 Data

This study used daily closing data from the capital market, USD/IDR exchange rates, and World Texas Intermediate (WTI) crude oil commodity prices during the period of 2005 to 2016. The capital market data in question was JCI daily closing data on the Indonesia Stock Exchange and Dow index Jones Industrial Average (DJIA) on the New York Stock Exchange (NYSE). The daily closing data for the capital market was obtained from Bloomberg. While the daily closing data of the USD/IDR exchange rate used was the middle rate and obtained from www.bi.go.id. While the World Texas Intermediate crude oil daily closing data was obtained from U.S. Energy Information Administration.

2.2 Analysis Technique

The data analysis technique used in this study was Generalized Autoregressive Conditional Heteroscedasticity (GARCH). The reason for choosing the GARCH analysis technique was because this research used time series data which is often not normal and cannot be normalized. The GARCH analysis model was first introduced by Bollerslev (1986).

The following are the equations used in this study:

$$\begin{aligned}
 Y_t &= \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \sigma_t^2 + \varepsilon_t \dots\dots\dots 1 \\
 \sigma_t^2 &= \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \dots + \alpha_p \varepsilon_{t-p}^2 + \lambda_1 \sigma_{t-1}^2 + \dots + \lambda_q \sigma_{t-q}^2 \dots\dots\dots 2
 \end{aligned}$$

Notes:

- Y_t = JCI variable at t-time
- β_0 = Constant
- β_1 - β_3 = Regression coefficient
- X_1 = Return of Dow Jones index
- X_2 = Return of USD/IDR exchange rate
- X_3 = Return of World Texas Intermediate crude oil
- σ^2_t = Variance at t-time
- ε_t = Residual at t-time
- Four parts of conditional variance:
- σ^2_t = Variance at t-time
- α_0 = Constant variance
- $\alpha_1\varepsilon^2_{t-1}$ = Volatility of the previous period (ARCH component)
- $\lambda_1\sigma^2_{t-1}$ = Previous period variance (GARCH component)

Before doing GARCH analysis, the data stationarity test was first done by using Augmented Dickey-Fuller Test or ADF Test. It was expected when the data stationary test was done, the data turned out to be stationary or there was no root unit. The stationary test was carried out using the level, 1st difference, and 2nd difference. Then, the test results or Augmented Dickey-Fuller test output, the ADF t-statistic value would be compared with the test of MacKinnon critical values at the level of trust 1%, 5%, and 10%. When the ADF t-Statistic value > tests MacKinnon critical values either at the level or level of trust 1%, 5% or 10%, H₀ is rejected. In addition, another way is to compare the probability value in the Augmented Dickey-Fuller test output with α (1%). If the value of probability < α (1%), then H₀ was rejected. H₀ is rejected which indicates that there is no unit root or the data is stationary (Enders, 2009).

3. RESULTS AND DISCUSSION

3.1 Descriptive Statistics

The following stage presents descriptive statistics of all variables used in this study. Descriptive statistics include minimum, maximum, mean, and standard deviation. Below, Table 1 presents descriptive statistics starting from JCI as the dependent variable and independent variables in a row, and the results of descriptive statistics are presented based on daily data with the number of samples in each variable as many as 2827 samples during the study period.

Table 1: Descriptive Statistics

No.	Variable	Minimum	Maximum	Mean	Std. Deviation
1.	Jakarta Composite Index	994.77	5523.29	3261.7	1436.23
2.	DJIA Index	6594.44	19974.62	13177.1	2954.78
3.	Exchange Rate (USD/IDR)	8460	14728	10361.97	1636.01
4.	World Crude Oil Price	26.21	145.29	75.77	22.75

Source: Bloomberg, www.bi.go.id, USEIA, processed.

It can be seen from the descriptive statistics in Table 1 which describes the movement of all variables used during this research period. The JCI as the dependent variable has a range of average movements at 3261.7 points and has a sample diversity of 1436.23 which can be seen in the standard deviation. Whereas for the Dow Jones index, which is an independent variable, shows the moving average in the range of 13177.1 points with a sample diversity level of 2954.78. Other independent variables which are the USD/IDR exchange rate has a movement average of around IDR10,361.97 per US Dollar with a sample diversity of 1636.01. While for the last independent variable which is the world crude oil price has an average price movement in the range of USD75.77 per Barrel and has a sample diversity level of 22.75. In the period of 2008-2009, the movement of the Dow Jones index is in sharp contrast to the decline after previously experiencing an increasing trend since 2005, while the significant JCI growth since 2005 is also disrupted from 2008 to 2009. According to Wibowo (2012), this condition is the effect of the 2008 global financial crisis in the US as the world economic power country and moreover, it is one of Indonesia's largest or main export destinations. This crisis caused many countries to experience an economic crisis which in the end, it was also followed by the collapse of the world capital market. Even in 2008, China's stock exchange experienced a correction of 57%, India at 52%, Indonesia at 41%, and the European zone at 37%. This happened because investors generally reacted to the weakening of a country's economy by selling off shares held in the country's capital market so that its stock index experienced a correction.

The movement pattern of the USD/IDR exchange rate variable as the independent variable and the JCI as the dependent variable during the period of 2005-2016 generally shows an opposite or negative movement pattern. The USD/IDR rate shows the lowest point or point of depression in December 2015 and the highest point or point of appreciation in May 2011. While the JCI variable experiences its lowest point in August 2005 and the highest point in April 2015. During the range of 2008 and early 2009, there was a significant gap between the weakening of the Rupiah toward the US Dollar with the decline in the JCI. The crisis occurred in the US caused a contagion effect on many countries such as Indonesia which made the US as one of its main export destinations. Therefore, when a crisis occurred, the US was experiencing a decline in purchasing power which had an impact on the decline in demand for American imports. The countries which were directly affected were those that made the US as the largest export market such as China, Indonesia, Japan, and Germany. Thus, Indonesia experienced a current account deficit which resulted in a weakening Rupiah exchange rate due to the declining demand for the Rupiah. The depreciation of the Rupiah was a negative sentiment for investors because it caused the cost of imported raw materials and issuer's foreign debt to increase. For this reason, the JCI decreased due to the decline in investor confidence marked by selling.

However, there were interesting phenomena throughout 2014 to the first quarter of 2015 when the Rupiah tended to weaken, while the JCI in 2014 grew by around 20% from 2013. Basically, the exchange rate was influenced by the demand and supply of the currency. If the demand for the Rupiah remains or decreases while the supply increases, the Rupiah will weaken. The weakening of the Rupiah toward the US Dollar looked quite significant. This was inseparable from Indonesia's trade balance deficit and high inflation to reach 8.36% in December 2014. The position of imports that is greater than exports means that the supply of Rupiah exceeds its demand so that the Rupiah depreciates. The deficit occurred was inseparable from the decline in global demand and the competitiveness of domestic products. Indonesia still relied on exports of natural resources, not products with high added value. In addition, the diversity and quality of products that were still low to meet domestic needs made such a dependence on imported goods difficult to control. Meanwhile, the inflation occurred was the impact of the increase in the price of fuel oil due to the cut in fuel subsidies that were diverted to the productive sector, such as education, health, and infrastructure programs. This made prices of domestic goods generally tended to increase, so the demand for imported products increased. As a result, there was a supply of Rupiah and demand for the US Dollar increased, as a result, the Rupiah weakened toward the US Dollar (Zinecker

et al., 2016). However, in the end, the trend of the trade balance and inflation reversed in 2016 which caused the Rupiah to experience a strengthening trend toward the US Dollar.

Further, the presidential election became the main sentiment of the JCI driving force in 2014. Leadership is indeed an important factor in the direction of investment movement. Investors generally hope that the new leadership era can give hope for improvements in the performance of the previous government. The stronger JCI was caused by foreign investors who were buying because of the positive sentiment from the presidential election. This was shown by the flow of foreign funds which reached a high record where the flow of foreign funds reached IDR 42.59 trillion compared to the 2013 period which only reached 20.65 trillion. Even, the JCI showed a strengthening trend to reach the highest record in April 2015 since 2005. Meanwhile, for crude oil price and JCI, in general, it can be concluded that the movement of these two variables tends to be positive, although in mid-2014 until the first quarter of 2015 there was a significant opposite direction. World crude oil prices experience their lowest point in February 2016 and their highest point in July 2008, while the JCI shows its lowest point in August 2005 and its highest point in April 2015. There was a phenomenon of increased world oil prices which reached their highest prices in July 2008, reaching USD145.18 per Barrel.

However, at the same time, the JCI did not move up and just the opposite. the phenomenon of the increase in world oil prices which reaches its highest price in history is inseparable from the large increase in demand from China and India and the existence of geopolitical risks in the Middle East. However, Sihono (2008) explained that China and India as the most developed economies in the Asian region were finally affected by the American crisis. The statement is in line with Wibowo (2012) who stated that the crisis experienced by the US resulted in the Chinese stock market experiencing a correction of 57% and India by 52%, so the decline in demand for oil commodities from both countries and world demand due to the economic recession also finally making oil prices to decline. Therefore, when oil prices increased and reached its highest price in history, on the other hand, there were concerns for investors of the crisis in America making the investors reacted by conducting panic selling and resulted in the JCI experiencing a correction. Further, when the economy experienced a recovery, oil prices began to rebound as world demand for oil began to recover, boosting the investors' confidence which resulted in the JCI to experience rebounding.

Yet, world oil prices began to experience a significant decline from mid-2014 to 2016. Mensi et al. (2018) underlined that the cause of the phenomenon of falling oil prices in the period was due to excess oil supply or oversupply from the United States, Canada, and Mexico. On the other hand, countries which became the members of OPEC still maintained their production volume. In addition, one of the largest oil-importing countries such as China experienced a slowdown in the rate of economic growth which resulted in a decline in oil demand from China. Fischel (1989) added that oil is the industry's main energy source. It is in line with Robiyanto (2018a) saying that the higher economic growth, it would require more and more crude oil to move the industry.

In addition, the JCI during the mid-2014 to the first quarter of 2015 was in an increasing trend. Besides the fact that there was a positive sentiment from the 2014 presidential election, investors suspected that the decline in crude oil prices was only temporary. However, along with the weakening of crude oil prices due to negative sentiments from the global, namely the economic slowdown in China and Europe and the Jakarta Composite Index which reached its historically highest record in April 2015, it made foreign investors made their profit taking or sell action. China is a country that becomes one of Indonesia's largest export destinations, making Indonesia also experienced a decline in economic growth to 4.79% in 2015 compared to the previous year which was 5.02%. On the other hand, there was uncertainty about the plan of the Central Bank of the US (Federal Reserve) which would increase their interest rates, which further weighed on the JCI's performance (Mensi et al., 2018; Robiyanto, 2018a).

3.2 The Result of the Augmented Dickey-Fuller Test

Stationary test on time series data or time series is absolutely necessary because time series data often has a root or non-stationary unit which causes dubious regression results or commonly called spurious regression. Therefore, it is necessary to conduct stationary tests, one of which can be done with the Augmented Dickey-Fuller (ADF) test. Table 2 shows the result of the Augmented Dickey-Fuller test of this study.

Table 2: The Result of the Augmented Dickey-Fuller Test

No.	Variable	t-statistic	Prob.	Conclusion
1.	Jakarta Composite Index	-49.03	0.00	Stationary
2.	DJIA Index	-29.14	0.00	Stationary
3.	Exchange Rate (USD/IDR)	-56.96	0.00	Stationary
4.	World Crude Oil Price	-55.92	0.00	Stationary

Source: Bloomberg, www.bi.go.id, USEIA, processed.

In Table 2, it can be seen that the probability value of all variables tested is significant at a 1% significance level so that the conclusion that the data of all variables used in this study has been stationary and can be analyzed using GARCH. Posedel (2005) stated that the GARCH (1,1) model is a standard or general model so that it can be directly used to analyze time series data in the financial field, especially return data. In addition, the model has also been used in many financial studies that use time series data. Based on this reason, this study used the GARCH (1,1), model.

3.3 The Result of GARCH (1,1) Analysis

Table 3 below shows the results of GARCH analysis (1,1). It can be seen that the probability value of all independent variables including Crude Oil, Dow Jones, and USD/IDR exchange rate which is smaller than $\alpha=1\%$. This indicated that all the independent variables used in this study individually had a significant effect on the JCI. In the variance equation, the significant ARCH element is seen from the probability value of 0.00 which is smaller than $\alpha=1\%$, meaning that the JCI prediction error was affected by the previous period residuals. While for the significant GARCH element, it is also seen from the probability value of 0.00 which is smaller than $\alpha=1\%$, meaning that the JCI prediction error was affected by the residual variant of the previous period. In addition, in Table 3 also shows the Adjusted R-squared value of 0.125976, meaning that the 12.59% volatility of JCI return during the study period can be explained by the variable Crude Oil, Dow Jones index, and USD/IDR exchange rate and the remaining 87.41% is explained by variables others that were not used in this research.

Table 3: The Result of GARCH (1,1) Analysis

Variable	t-statistic	Prob.
DJIA Index	0.127581	0.00
Exchange Rate (USD/IDR)	-0.638028	0.00
World Crude Oil Price	0.029659	0.00
RESID(-1)^2		0.00
GARCH(-1)		0.00
Adjusted R-Squared	0.125976	

Source: Bloomberg, www.bi.go.id, USEIA, processed.

3.4 Discussion

The results of GARCH analysis (1.1) in Table 3 show the influence of the Dow Jones index on the JCI with a positive coefficient value. This is in accordance with H_1 in this study which states that the Dow Jones index has a positive effect on the JCI, meaning that when the Dow Jones index strengthens, it will be followed by the JCI which has also strengthened and vice versa. This happened because the US is a world economic power. The fact that there is a globalization of the economy, the turmoil experiences the US economy will affect the economies of many countries. This especially happens to the economy which becomes a trading partner of the US including Indonesia which makes the US one of the main destinations in its export activities. Therefore, if the US economic conditions of the reflected in the Dow Jones index was in good condition, it would push the Indonesian economy to be reflected in the JCI through export activities, direct investment, and capital flow into the Indonesian capital market. The results of this study were in line with the studies by Majid and Kassim (2009); Marjohan (2015); Venska et al. (2014) which proved the Dow Jones index had a positive effect on the JCI.

Further, for the USD/IDR exchange rate variable, it has a negative coefficient and a significant effect on the JCI. This is in accordance with H_2 of this study which states that the exchange rate of the Rupiah toward the US Dollar has a negative effect on the JCI, meaning that when the Rupiah exchange rate toward the US Dollar depreciates, the JCI will weaken or be corrected. The depreciation of the exchange rate of the Rupiah toward the US Dollar would increase the cost of imported raw materials as well as the amount of Rupiah needed by the issuer to pay off foreign debt which will ultimately reduce its profit. In addition, the weakening of the Rupiah toward the US Dollar was an indication of risky economic fundamentals for investors. The decline in issuer's profitability, as well as Indonesia's economic fundamentals which were not good, was a negative sentiment for investors which eventually encouraged investors to wait and see and sell so that the JCI weakened. The results of this study were consistent with studies by Abduh and Surur (2013); Yogaswari et al. (2012) which had previously proven that the exchange rate of USD/IDR had a negative effect on the JCI.

While for the crude oil price variable, it has a positive coefficient value and a significant effect on the JCI. It indicated that the increase in crude oil prices would push the JCI up and vice versa. A positive coefficient value from the results of this study is not in accordance with H_3 which states it influences negatively on the JCI. Crude oil is the main energy source which makes it plays an important role in the economy (Fischel, 1989). This statement is supported by Gisser and Goodwin (1986); Robiyanto (2018a) who stated that the higher economic growth, it certainly needed more and more oil to move its industry. From these two statements, it could be concluded that economic activities could not be separated from crude oil which is indeed the main fuel source so that the movement of oil prices is determined by supply and demand. Furthermore, Wibowo (2012) explained that the world crude oil price movements reflect the world economy if oil price movements occur due to an element of demand. This underlined that the increase in oil prices reflected the increase in world demand for oil which was certainly would increase economic activity. This was also happened during crisis and recovery due to the 2008 global financial crisis. When the world economy began to experience a recession, the demand for oil experienced a significant decline which resulted in a fall in oil prices. However, when the economic recovery period occurred, oil prices also began to recover due to the recovery of the world demand for oil and this made investors' confidence returned resulting in the JCI to experience rebounding.

The positive influence of world oil prices on the JCI shows that Indonesia's consumption of oil is experiencing an increasing trend. The increasing trend indicates that the Indonesian economy is likely to grow. The economy that is experiencing growth will certainly be a positive sentiment for investors, so investors are interested in investing their capital in shares listed on the IDX. Therefore, in the end, there was an increase in stock prices reflected in the JCI.

CONCLUSION

This study found that the Indonesian capital market condition, especially stock instruments reflected in the JCI, was influenced by movements in the exchange rate, crude oil commodities, and foreign exchanges which in this case was the main stock exchange index in the United States, namely the Dow Jones index. However, there was a direction of unequal influence from each independent variable on the dependent variable used in this study.

The Dow Jones Index as a major stock index that reflected the economic performance of the United States had a positive influence on the JCI. This result showed that the increase in the Dow Jones index would be followed by an increase in the JCI and vice versa. While the variable of the exchange rate of the Rupiah toward the US Dollar had a negative influence on the JCI. The negative coefficient indicated that the weakening of the Rupiah exchange rate toward the US Dollar would cause the JCI to weaken and vice versa. Meanwhile, for the variable of price of crude oil. as the main energy source and the driving force of the economy, had a positive influence on the JCI. This showed that the increase in crude oil prices would be followed by an increase in the JCI and vice versa.

This study did not separate periods that have the potential to have an effect of turmoil on capital markets, such as the financial crisis experienced by the US in 2008. In addition, this study assumed direct influence from the independent variable on the dependent variable. Thus, future research is suggested to examine the indirect effect by involving intermediary variables in the research model, such as issuer's profit. Future research is also expected to be able to separate the research period during the financial crisis in order to produce more detailed research results and can use different research periods.

The results of this study proved that there was a positive influence from the Dow Jones index on the JCI, where the Dow Jones index which experienced a strengthening trend would be followed by the JCI which also experienced a strengthening. Therefore, under these conditions, it is the right time for local and foreign investors to invest their capital in stocks listed on the Indonesia Stock Exchange (IDX).

On the other hand, for the variable exchange rate of the Rupiah toward the United States Dollar, it showed a negative influence on the JCI, where the appreciation trend of the Rupiah toward the US Dollar would be followed by the JCI which had strengthened. Therefore, it is the right time for investors to invest in stocks listed on the Indonesia Stock Exchange.

Finally, for the world oil price variable, the results of this study showed a positive influence on the JCI, where the world oil price which showed a strengthening pattern would be followed by the JCI which also experienced a strengthening. Therefore, it is the right time for investors to invest in stocks listed on the Indonesia Stock Exchange.

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