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RELATIONSHIP BETWEEN CRUDE PRICE AND INDONESIA STOCK MARKET

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Abstract. The surge in crude oil price in the course of a recent year has created lots of interest for the relationship between crude oil price and the stock market. In recent year, crude oil price had significant move in the world. Crude oil price decreases to lower price in the history. This situation makes the company get significant impact especially for Energy Company and Production Company that used crude oil for primary material that will affect stock value of the company. The little move in crude oil price will give move in country stock market performance. That movement makes some impact in the Indonesia stock market that their stock has unpredicted move in the Indonesia stock market. The movement of crude oil price will affect movement stock market get negative or positive impact. It will make investor and internal management make some policy to move in Indonesia stock market based on analysis of the relation between crude oil price and the stock market. The researcher propose of this study to know how far dynamic relation between crude oil price and stock market in emerging market like Indonesia. This research will give comprehensive study about the relation between oil price and stock market for large scope research. the investor can make this research can be used in make decision making to invest in Indonesia The data about IHSG and stock price will gather from Yahoo Finance and crude oil price will be gather from Bloomberg Website. The range time period of data is from January 2008 to April 2016. The methodology of this study is use unit root test, Johansen's cointegration test, vector error correction model (VECM), Granger causality test, impulse response functions (IRFs) and variance decompositions (VDCs) to looking relation between crude oil price and Indonesia Stock Market. The result of these studies is there a not relationship between crude oil price and Indonesia Stock market in a long-term relationship. This result will give insight to future research about relation oil price and stock market and give one subject to investor in make decision to invest in Indonesia .

Keyword: Crude oil price, Stock Market, Long-term relationship, Indonesia

Introduction

The surge in oil price in the course of a recent year has created lots of interest for the relationship between oil price and the stock market. It gets more attention because oil price and the stock market is a crucial part of the economy development. Recently, movement in oil price gets more attention regularly because their movement nowadays oil price had significant move in the world. Oil price decreases to a lower level because the United States domestic oil production has nearly second and the United States did not have to import oil. This situation makes the company get significant impact especially for Energy Company and Production Company that used oil for primary material. It makes some impact in the financial market that their stock has unpredicted move in the financial market. The researcher wants to know how far dynamic relation between oil price and stock price in emerging market like Indonesia. The reason researcher wants analysis in

Indonesia is economies in emerging country will developing and succeeds, and there so few researchers about relation oil price to Indonesia stock market in Indonesia. It can become one of material to research to a larger scope. Other that reasons this research can be use by investor or policymaker can get more analysis before they invest in Indonesia or make policy for macroeconomic regulation in Indonesia.

Literature Review

From empirical preventive, a substantial academic and professional literature in the developed countries likes USA, Japan, Australia, etc. They have been the analysis of relationship or interaction between oil price and stock market performance. The theatrical basis for relations that oil price movement effect gets transmitted to macroeconomic fundamental which it turns to affect the liquidity in the stock market (Ghosh & Kanjilal, 2014). Oil price shock effect stock market return or price through their expected earning (Jones, Leiby, & Paik, 2003). Uri & Boyd (1997) found that the oil price volatilities also make decrease people's consumption and investment in Mexico. The response of stock market performance to volatility oil price is the negative or positive impact in aggregate real stock return. It depends whether decreasing or increasing of oil price driven by demand shock or supply shock in the crude oil market. Other than that reason, the reason actual and adverse impact can look to the status of a country just like importing or exporting oil country. It will give significant effect to the stock market.

Literature reviews explaining a negative relationship between oil price and stock price. There some research that has resulted to describe the negative relationship between oil price and stock market movement. In macroeconomic view, the rising of oil price has an influence to earning of companies for which oil is a direct or indirect cost of production in the enterprise. If the enterprise can manage this cost or pass this cost to their customer, the company must rise their sells goods to get same profit to pass the cost. Bu if the company not pass the cost to customer, the company will get decreasing to their profit, and it will give impact to the dividend which is a key driver of stock price. Moreover, the non-oil producing nation must bear rising the cost and face the increasing of risk and uncertain caused by oil price fluctuation which negatively affect the stock price. There more effect from oil price which negatively affect the stock market. Oil hikes make some inflationary pressure which makes central bank and policy maker (government) control inflation with an increased interest rate. The rising of interest rate has a direct relationship with a discount rate in equity pricing model of stock. It leads to a declining of a stock price.

Literature reviews explaining a positive relationship between oil price and stock price. The stock price might have positively impact to the stock market with several reasons. It can look in risen of economic after recession stage. It will make global demand risen, and it leads to the rise of basic material like crude oil. The other reason is the type of nation in oil production. If it is oil exporting, it will have positively impact if oil price gets an increase because it will effect in income and wealth effect. Transfer wealth in export and import have fast response. The increase in revenue for the nation will make the nation build infrastructure and purchasing good or service. It generates a higher level of economic activity and improvement of stock market return to those oil exporting nation.

Research Design

Data

This research is analysis the effect of oil price volatility to Indonesia stock market. The effect of oil price depends on the status of the country in using oil just like importing or exporting oil. Data that the researcher uses is oil price, Index HargaSahamGabungan (IHSG), and 5 Oil Company stock

prices. This data will get from many website/the internet. Oil price gets from Bloomberg website, and IHSG will get from yahoo finance website. Period of data is from January 2008- March 2016. This period data to look the relation after economic crisis 2008 to oil price crisis in 2015

Methodology

To process this research, the research first study of the data from economic preventive with help descriptive data and unit root test. This will us to use Johansen's Cointegration for long-term relation, VECM to know short term relation, and Granger causality to know direction of causality. *Unit Root Test,* In this research, the researcher must make stationery analysis for data that researcher uses before input it to the methodology. Unit Root Test can be used to determine if the data should be differenced or regressed on the deterministic function of time to render data stationery. Hence, pre-testing unit root often used first in cointegration method. In these researches, the result achieved by regression analysis is not reflecting the real relationship if the data is non-stationary data. So, to avoid error to look the relation between variable the researcher use Unit root Test. Tests are applied to determine the variable stationary properties and order to the integration of the variable. Unit root test that usually use is Augmented David Dickey, Wayne Fuller, Peter Phillips, PierrePerron for autoregressive unit root test for search unit root. In this research, the researcher will ust use Augmented Dickey Fuller Test(ADF). The hypotheses this method is Ho hypothesis shows that series is not stationary and has the unit root, alternative hypothesis shows that series is stationary. If the calculated value is bigger than the absolute critical value, then Ho hypothesis is rejected, and series is decided to be stationary.

Johansen's Cointegration Test, The cointegration regressions usually use Johansen's Cointegration Approach. This method is used to know the long-term equilibrium relationship between variable. Engle-Granger has developed this theory. This method will use if data that analysis is non-stationary data. In the economic, two variable called cointegration if they have a long-term relationship between them. With this theory, we can get information about the variable, particularly oil price and Indonesia stock market were tied together in the long term or not. Hypotheses that will be examined with Johansen's Cointegration Test in this studies/ research is
Ho: There is no co-integration relationship between variables
H1: There is co-integration relationship between variables

VECM, We will use this method according to with the result of Johansen Cointegration test. To proceed to this method we use have minimum one cointegration or there are a long-term relationship between a variable that we research. If between variable did not have cointegration or did not have long term relationship, this research will stop in Johansen Cointegration Method. There often exists long-term equilibrium relationship between two or more variable, but it will have a different relationship in short term period. It possible there some disequilibrium relationship between the variable in short term period. So, causality relationship must be analyzed by error correction model (Vector Error Correction Method). VECM will provide us information about disequilibrium in short term period and rate of correction to attain in long-term equilibrium relationship among variable. The error correction procedure is henceforth an approach to accommodate short-run and long-run conduct through a progression of fractional short-run conformities.

Granger Causality Test, Granger causality used to determine the direction of the relationship between variable. The error correction strategy that suggested by Engle and Granger (1897) should be used to identify short term and long term period. The VECM is used to detecting the long run and short term causality when the variable is cointegrated. VECM can distinguish between short-run causality and long-term causality because this method can capture both short-run dynamics between the time series and long-term equilibrium relation. The error correction term captures long relationship among variable and causality is test by significant of the t-test of correction error that contains long-term information. Other that long term, short run causality is analyzed by the joint significance of the coefficient of the differenced explanatory variable by using F-static and x2 test static

Variance Decomposition Test and Impulse Respond, Analysis After the researcher define causality in the short run relationship, the causal test does not determine the strength of a causal connection between variable nor causality test not explain about a relationship between variable over time. Variance Decomposition Test is provided us to explore the degree of exogeneity of variable involves in research. It gives us illustration the share forecast error of one variable; as a result, some change in another variable. Impulse Respond Analysis gives us a quantitative idea about the impact for several periods in future. Impulse Response Analysis on VAR system gives an explanation how each variable respond to improvement from another variable in the system.

Finding of Result

Finding Descriptive Result

Table 1 Descriptive Statistic

Statistic	Crude Oil Price	IHSG
Mean	89.01211	3704.123
Median	98.33	3964.675
Maximum	146.08	5523.29
Minimum	27.88	1111.39
Std. Dev.	26.40412	1156.653
Skewness	-.4663618	-.5146828
Kurtosis	2.049649	2.159555
Observations	3014	3014

The basic statistic value of data was calculated first in this research and can be viewed in Table I. in Table I; the researcher observed that oil price and IHSG do not have stable value at all during the study period. In respect of oil price the maximum value is 146.08 and minimum value about 27.88 are found with the mean is 89.0121, which they have great volatility. The standard deviation value of this data is 26.40412; it also shows instability of daily of oil price During value of IHSG(Indonesia Stock Price) have the great significant difference between maximum and minimum it can look instability just like oil price. IHSG have maximum value 5523.29 a have minimum values 1111.39 are found with mean about 3704.123, it makes the value of IHSG have great volatility. The standard deviation of IHSG data is 1156.653; it gives evidence about the instability of data.

Regarding whether series is distribution normally or not; skewness and kurtosis are considered. If kurtosis is more than three, it indicates the series is sharp if kurtosis is smaller than three, it indicates that the series is oblate. In consideration of skewness value is zero or not. If skewness is zero; it indicates the data is a normal distribution. If it more than zero; it indicates the series is not

distribution normally to a positive direction. If skewness is smaller than zero; it indicates that series is not normally distribution normal to the negative direction.

There are skewness and kurtosis that make us know that both series of the variable is not normally distribution with negative direction and oblate series. Thi condition happen because both series have negative skewness and have smaller than three torturous. It can be concluding both values of the variable has not distribution normally, but the median value is close to an average value of data.

Finding Unit Root Test

Table 2 Unit Root Test

Variable	ADF Test Statistics	
	Intercept	Trend And Intercept
IHSG	-0.709 [0] (0.8444)	-2.086 [0] (0.5540)
Brent Oil Price	-0.680 [0] (0.8518)	-0.855 [0] (0.9608)

The result of unit root test applied in level can be seen in the table above. After the researcher examined the table above, the researchers have examined on–stationary variable or the variable have unit root test in both models (Augmented Dickey-Fuller Method). If we look the result in the table above, the researcher analyzes and conclude both approaches cannot reject null hypotheses at 5 percent critical value which the value of 5 percent critical value is -2.860 for only intercept and -3.410 for trend and intercept because the result is higher than 5 percent critical value. After the researchers have looked that variable is non-stationary data, the researcher is analyzed first different for the variable. To get more information about data is truly non-stationary or stationery, researcher analyzes more data with the first difference of data and the result can be seen in next table.

Table 3 Unit Root First Difference

Variable	ADF Test Statistics	
	Intercept	Trend And Intercept
IHSG	-33.571 [0] (0.0000)	-33.566 [0] (0.0000)
Brent Oil Price	-36.769 [0] (0.0000)	-36.791 [0] (0.0000)

After we look at the first difference, the researchers analyze the result in the table above and have a lower value than critical value at 5 percent. So, the conclusion is that first different result unit root test is stationary data or do not have unit root data.

Finding Lag Selection

Table 4 Lag Selection Result

Lag	LL	LR	Df	P	FPE	AIC	HQIC	SBIC
0	39579.9			9.1e+08	26.309	26.309	26.3104	26.313

1	19838.1	39484	4	0.000	1833.66	13.1898	13.1941	13.2018
2	19790.6	94.928	4	0.000	1781.45	13.1609	13.1681*	13.1809*
3	-19784.8	11.688	4	0.020	1779.27	13.1597	13.1698	13.1877
4	-19777.7	14.125*	4	0.007	1775.65*	13.1577*	13.1706	13.1936
5	-19777.6	.2099	4	0.995	1780.25	13.1603	13.1761	13.2042

Autoregressive has significant sensitivity in the selection of appropriate lag length; this research must have optimum lag length before conducting cointegration analysis with Johansen Cointegrated method. Based on the paper, this researcher will determine to optimize lag length based on Akaike information criteria (AIC), Schwarz's Bayesian information criteria (SBIC), and Hannah-Quinn information criteria (HQIC). After the researcher analysis the result in Table III, we can know that AIC criteria suggest using four lag length, SBIC criteria suggest to use two lag length, and HQIC criteria suggest to use two lag length. Then, the researcher concludes to use two lag length for Johansen Cointegration Method

3.4 Finding Johansen's Cointegration

Johansen tests for cointegration

Trend: constant — Number of obs = 3012

Sample: 03jan2008 - 01apr2016 — Lags = 2

maximum rank	parms	LL	eigenvalue	trace statistic	5% critical value
0	6	-19810.025	.	1.4455*	15.41
1	9	-19809.318	0.00047	0.0321	3.76
2	10	-19809.302	0.00001		

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Table 5 Johansen's Cointegration Test

In this section, the researcher wants to see equilibrium in the long-term relationship between oil price and the stock market. The researcher uses Johansen cointegration to an analysis equilibrium in a long-term relationship. In this method, null hypotheses o this method is r=0(i,e = no cointegration) is 1.455, respectively, and eigen maximum statistic in the table above is 1.4134, respectively. After the researcher analyses, the null hypothesis of no cointegrated in r=0 is accepted at 5 percent critical value. As calculated value trace statistic and maximum Eigen statistic is lower than MacKinnon-Haug-Michelis critical value at 5 percent of significant. This result indicates that there no exits one cointegrating vector in case. So, Johansen cointegrated's test result does not support the hypothesis that oil price and stock market are cointegration or have one cointegration relationship between oil price and the stock market. So with this result, the researcher has

concluded that oil price does not give impact to the stock market in long term relationship. After we get the result that oil price did not give impact to the stock market in long term relationship, the researcher does not have to proceed to next step. Next step is VECM. To use VECM, the result of Johansen must have minimum one cointegration or there is a relationship between variable. So, the researcher does not proceed to next step because the result is oil price did not give impact to the stock market in long term relationship.After looking the result between oil price to IHSG, the researcher tries the methodology to each company stock price that has a direct relationship to oil price. The researcher doing this research to some stock in IDX have influenced to the relation between oil price to IHSG. So the researcher looks relation between oil prices to each company stock price. In Indonesia, there are ten companies that have used oil price as raw material or sell goods.

But, the researcher will just use five company because the company that has get into Indonesian Stock Exchange (IDX) since 2008 is AKR Comporindo, Apexindo Pratama Duta, Medco Energi International, Energi Mega Persada, Ratu Prabu Energi. After we are doing same research, the research found result relationship between oil price to each stock price. It can be viewed in the table

Table 6 Johansen's Cointegration Test Stock Price

Company	Trace Statistic	5% Critical Value
AKR Comporindo (AKR)	2.5498	15.41
Apexindo Pratama Duta (APEX)	7.9810	15.41
Medco Energi International (MEDC)	10.7273	15.41
Energi Mega Persada (ENGR)	7.6297	15.41
Ratu Prabu Energi (ARTI)	25.4148	15.41

After the researcher looks in the result, the researcher analyzes the data. The researcher concludes that number the companies in Indonesia Stock Exchange(IDX) is not influenced the relationship between oil price to Indonesia stock market. It can look among stock price that tested is just one company stock that has cointegration or has a long-term relationship with oil price. It can be a view that oil price did not have an impact on the long-term relationship between oil price to the stock market in Indonesia.

Conclusion

After research relation between crude oil price to the movement of the stock market, the researcher conclude that there not exist a long-term relationship between crude oil price to movement of stock market. The researcher have do Johansen Co-integration to check long term relationship between crude oil price to movement of the stock market and get the result that there, not cointegrated between crude oil price to movement of the stock market or there not long term relationship between variable. that researcher concludes that there not relationship between oil price and Indonesia stock market.

Results of this research provide comprehensive understanding between relationships of crude oil price to movement of Indonesia stock market. For the investor, this research can become one of consideration to more decision when to chose to invest in Indonesia stock market or company in Indonesia. This research is expected to give more information to the investor that in doing investing in Indonesia did not have look the change or movement of oil price because there are no relation between oil price and Indonesia stock market. The investor can compose to invest in Indonesia, even though there are changing in movement in oil price. Internal managerial just like shareholder

or portfolio manager can make this research become one of consideration to review their portfolio structure and evaluation to improve portfolio performance and structure. This research also suggests for some future studies to understand more about this research or this issue. The possible extend to this research is change crude oil price with another element just like gasoline price from Singapore that result of the chemistry of crude oil price. It will make this issue, or research will be more informative to the policymaker, investor, and internal management. However, this is beyond the goal of this research.

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