THE RELATIONSHIP AMONG OIL PRICES, GOLD PRICES, GROSS DOMESTIC PRODUCT, AND INTEREST RATE TO THE STOCK MARKET RETURN OF BASIC INDUSTRY AND CHEMICAL SECTOR IN INDONESIA IN 2005-2013

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Abstract-In this research author try to analyze the relationship among oil price, gold price, gross domestic product, and interest rate to the stock market return on basic industry and chemical sector in Indonesia in the period of 2005-2013. To seek the relationship among these variables, author conducts several methods, which are the classic assumption tests, multiple linear regression, and Hypothesis testing by using F test and T test. These methods will reveal the effect of each variable, as the factor of economic activity, towards the stock return of basic industry and chemical companies which listed in Jakarta Composite Index since 2005 to 2013.The result represented that some variables significantly influenced the stock return, one variable does not really significantly influenced the stock return, and one variable should be taken off because it could not pass the method. In the earlier of examining the classic assumption test, author brought 4 variables, which are Oil Price, Gold Price, GDP, and Interest Rate. During running the multicollinearity test, it was found that the GDP and Gold Price has a correlation so one of them should be take off, which is Gold Price. After completing the entire test, author found that Oil Price and Interest Rate significantly influence the value of stick return. Thus, if the oil price or interest rate in the actual financial market increases, the value of stock return will be decreased. Meanwhile, GDP has lower significance level to influence the value of stock return or in the other words; GDP does not significantly influence the value of stock return regarding its low value of multiplier. But the value of GDP will increase the value of stock return.

Keywords: Multiple Linear Regressions, Oil Price, Gold Price, Interest Rate, GDP, Stock Return, Basic Industry and Chemical Companies, Jakarta Composite Index.

Introduction

Stock return is very fluctuative; it moves depend on a lot of factors. There are internal factors, which come from the company itself, and external factors or in this topic we can mention as macroeconomics, which come from the actual condition outside of the company, which are able to affect stock return movement. In this study, author wants to do research for the external factors, including the oil price, gold price, gross domestic product of Indonesia, and the interest rate in Indonesia. Oil prices determine the costs of a country's economy. The high level of oil price may diminish a country's economy movement, so does the gold prices. Nevertheless, there should be some industries which benefit from high oil and gold prices. Therefore, there are still opportunities for certain industries for smart investors. Gross domestic products aim to measure the prosperity level of a country and to obtain the detail data about the products of a country in certain period. Gross domestic product will also classify a country into Industrial country, agraric country, or service country. So that GDP may help foreign investors to choose the suggestedstock to invest in a country. Interest rate is a benchmark of a country's economy activity

which affects the turnover of financial flows, inflation rate, investment, and currency activity. These four factors bring high impact of country's economyic activity and in this study author aims to research the correlation stock return on these four factors. The main purpose of this study is to examine the effect of oil prices, gold prices, gross domestic product, and interest rate to the stock return in industrial sector which are listed in Indonesia Stock exchange from 2005 until 2013. In the near future, it is expected this study may help the investors, whether the domestic or foreign, in facing the economics change.

Literature Review

Stock returns will be measured by the sum of the change in the market price of security at the beginning of the holding period (Elton & Gruber, 1995:19). Macroeconomics is the study of the economy in the aggregate and has a focus and theory that is continually changing. The general focus of macroeconomics is on unemployment, business cycles, growth, and inflation. In this research, author examine more about the objects studied in macroeconomics, which are gross domestic product of Indonesia, gold and oil price, and the interest rate.

Methods

Classical Assumption Test
According to Gujarati (2004), classic assumption test divided into four steps, which are normality test, auto-correlation test, multicollinearity test, heteroscedasticity test. The purpose of classic assumption test is to deliver Best Linear Unbiased Estimator or BLUE. This BLUE indicates that the regression model contain no problem and can be proved as a valid data. Below mentioned four steps to complete the classical assumption test.
Normality Test
Normality test aims to measure the normal distribution of the data. If there is any disruption found during running this test, the statistical result will not be valid. In this research, normality test conducted using Kolmogorov-Smirnov test.The result of this test will be compared with the critical value. Normality test can be performed by compared a with the Kolmogorov-Smirnof scale with term and condition as follow:

- If significance value (Sig) > a = 0.05
  o That means that the data is normlly distributed
- If significance value (Sig) < a = 0.05
  o That means that the data is not normally distributed

Auto-correlation Test
Auto-correlation test is used to ensure that there is no correlation between the values of observation inside the independent value. In this research, author conduct the Durbin-Watson test to determine the auto-correlation.
Null Hypothesis (H_0) : There is auto-correlation
Alternative Hypothesis (H_1) : There is no autocorrelation
Hypothesis is tested based on the SPSS result:
If the dU < dW < 4-dU, H_0 is rejected H_1 is accepted
If dL < dW < dU, or 4-dU < dW < 4, H_0 is accepted and H_1 is rejected
Multicollinearity Test
Multicollinearity test is used to determine whether each independent variable has correlation with each other. The independent variables used should not show any correlation with each other. In determining this correlation, author conducts test to calculate variance inflation factor (VIF).
Null Hypothesis (H_0): There is multicollinearity between the independent variables.
Alternative Hypothesis (H_1): There is no multicollinearity between the independent variables.

The hypothesis is tested based on the SPSS result:

If VIF < 10, H_1 is accepted and H_0 is rejected

If VIF > 10, H_0 is accepted and H_1 is rejected

Heteroskedasticity Test

Heteroskedasticity test is used to determine the availibality of random variables which have inequality of variance. In this research, the method used is scatterplot figure. One of the requirement to apply the linear regression model is the data should be free of heteroskedasticity. In this test author conduct the Spearman Rank.

Null Hypothesis (H_0): There is heteroskedasticity between the independent variables

Alternative Heypothesis (H_1): There is no heteroskedasticity between the independent variables

2.   Multiple Linear Regression

Multiple linear regression is used to assist author to model the relationship between the xplanatory variables and a response variables by turning the variables into a linear equation as stated in the research model. The value for the equation are observed by SPSS

3.   Coefficient Determination Analysis

Coefficient Determination or R^2 indicates the proportion of the dependent variable that can be explained by the independent variables in the regression model. For example, when the R^2 shows the result of 0.3, it means that the independent variables have 30% of influences to the dependent variable.

4.   Hypothesis Testing

After completing the assumption test, the hypothesis testing needs to be conducted such as F-Test and T-Test

 F-Test

F-Test is used to show the simultaneous significant influence of independent variables to dependent variable.

Null Hypothesis (H_0): There is no simultaneous significant influence of the independent variables to dependant variable.

Alternative Heypothesis (H_1): There is simultaneous significant influence of the independent variables to dependant variable.

Hypothesis is tested based on the SPSS result:

If the significance value < significance level (0.05), H_1 is accepted and H_0 is rejected

If the significance value > significance level (0.05), H_0 is accepted and H_1 is rejected

T-Test

T-Test is used to examine the partial hypothesis and shows the significant influence from each independent variables to dependent variable.

Null Hypothesis (H_0): There is no significant influence of the independent variables to dependant variable.

Alternative Heypothesis (H_1): There is significant influence of the independent variables to dependant variable.

Hypothesis is tested based on the SPSS result:

If the p value < significance level (0.05), H_1 is accepted and H_0 is rejected

If the p value > significance level (0.05), H_0 is accepted and H_1 is rejected

Result

Normality Test

The normality test was conducted with Kolmogorov-Smirnov test through SPSS 13 software and the result obtained is shown on the table 4.6

Table 4.1 Normality test

One-Sample Kolmogorov-Smirnov Test

		Unstandardized Residual
N		162
Normal Parameters [a,b]	Mean	,0000000
	Std. Deviation	,61450109
Most Extreme Differences	Absolute	,092
	Positive	,084
	Negative	-,092
Kolmogorov-Smirnov Z		1,172
Asymp. Sig. (2-tailed)		,128

a. Test distribution is Normal.

b. Calculated from data.

The normality test based in Kolmogorov-Smirnov test requires normal curve where the Asymp. Sig. is more than the maximum range, which is 0.05. The table 4.1 presents that the significance value (Asymp. Sig.) is 0.128. Therefore, it can be concluded the data on table 4.1 distributed normally since it passed the Kolmogorov-Smirnov test.

Multicollinearity Test

In examining the multicollinearity of the data, Variance Inflation Factors (VIF) was conducted by the author through software SPSS 13 and the result is shown in table 4.7

Table 4.2 Multicollinearity Test

Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	VIF
1	GOLD PRICE (US$)	,064	15,580
	OIL PRICE (US$)	,201	4,967
	GDP (RP)	,087	11,523
	INTEREST RATE (%)	,222	4,504

a. Dependent Variable: RETURN

Based on the table 4.2, it is found that there is correlation between Gold Price and GDP since their VIF are higher than 10. To overcome the multicollinearity problem, author took out one independent variable that is the victim of the multicollinearity problem which is Gold Price. The recalculation of the multicollinearity test without Gold Price is provided on table 4.3.

Table 4.3 Multicollinearity Test without Gold Price

Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	VIF
1	OIL PRICE (US$)	,256	3,899
	GDP (RP)	,138	7,255
	INTEREST RATE (%)	,278	3,600

a. Dependent Variable: RETURN

Based on the output 4.3, can be found that the VIF of all variables are less than 10, thus it can be concluded that there is no multicollinearity in the data.

Autocorrelation Test

The autocorrelation test was conducted by Durbin Watson, through comparing the Durbin-Watson (DW) value and the critical value (dL and dU). With the sample size (n) = 162, α = 0,05 and the number of independent variables (k) = 3, it can be found that dL = 1,7055 and dU =1,7809

The result of autocorrelation is shown on the table 4.4

Tabel 4.4 Autocorrelation Test

Model Summary[b]

Model	Durbin-Watson
1	2,170

b. Dependent Variable: RETURN

Based on the table 4.9, it is presented that the value of Durbin-Watson is 2,170. Since the DW lies between dU (1,7809) < DW (2,170) < 4 – dU (2,219), so it can be concluded that there is no autocorrelation among the data.

Heteroskedasticiy Test

In this research, author conducted Spearmen Rank to examine the heteroskedasticy among the data through SPSS 13 software and the result is shown on the table 4.10

Table 4.5 Heteroskedasticity Test

Correlations

			Unstandardized Residual
Spearman's rho	OIL PRICE (US$)	Correlation Coefficient	,023
		Sig. (2-tailed)	,767
		N	162
	GDP (RP)	Correlation Coefficient	,022
		Sig. (2-tailed)	,780
		N	162
	INTEREST RATE (%)	Correlation Coefficient	-,023
		Sig. (2-tailed)	,776
		N	162

Based on the table 4.5, it can be found that all the Sig. (2 tailed) value, which refers the heteroskedasticity, is more than 0.05. Thus, it can be concluded that there is no heteroskedasticiy among the data.

Since the four classical assumption tests have been completed and all the data passed the test well, so the result of this estimation regression model can be awarded as BLUE or Best Linear Unbiased Estimation.

Multiple Linear Regressions

To examine the relationship of oil price (x_1), GDP (x_2) and interest rate (x_3) toward stock return (y), author conducted the multiple linear regression analysis (R).

Table 4.6 Multiple Linear Regression Analysis

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,449[a]	,202	,187	,62031

a. Predictors: (Constant), INTEREST RATE (%), OIL PRICE (US$), GDP (RP)

The calculation 4.6 shows that the coefficient of correlation (R) is 0,449. This value indicates that there is a good relationship between Oil Price (X_1), GDP (X_2) and Interest Rate (X_3) towards stock return (Y).

Coefficient of Determination

The measurement of influence of Oil Price (X_1), GDP (X_2) and Interest Rate (X_3) towards stock return can be shown by the coefficient of determination through this formula:

KD $= R^2$ x 100%
$= (0,449)^2$ x 100%
$= 20,2\%$

The calculation above presents that the Variable Oil Price (X_1), GDP (X_2) and Interest Rate (X_3) influence the stock return for 20.2%, meanwhile the other factors, which is the variable beside oil price, GDP and interest rate, influence the stock return for 79.8%

Hypothesis Testing

A. Overall Hypothesis Testing (F-test)

The influence of the independent variables over the dependent variable simultaneously is determined using F-test.

Ho: No significant effects of the Oil Price (X1), the GDP (X2) and the Interest Rate (X3) towards the Return (Y).

Ha: There is a significant effect of the Oil Price (X1), the GDP (X2) and the Interest Rate (X3) towards the Return (Y).

a = 5%

F result from the SPSS calculation presented in the following table

Table 4.7 F-test Hypothesis

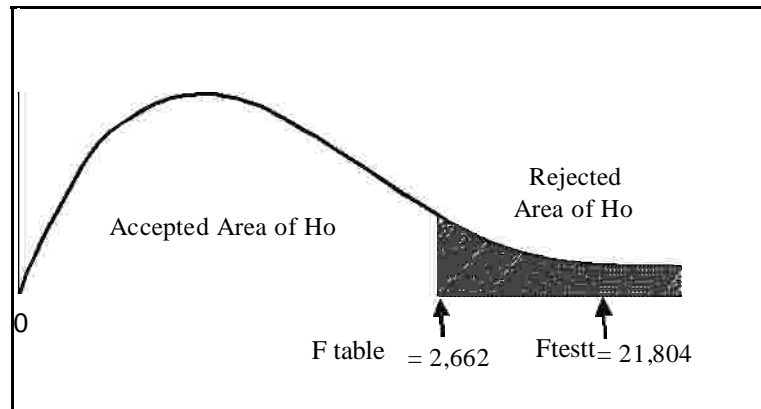| F test	df	F table	Sig	Description	Conclusion
13,326	df1 = 3 df2 = 158	2,662	0.000	Ho rejected	Significant

Figure 4.7 Rejected Area of H_0 on Simultaneous Test

Table 4.7 shows the F test value which is 13,326. Because the value F test (13,326) > F table (2,662), then Ho is rejected. Thus, it can be concluded that simultaneously there are significant influences of the Oil Price (X_1), the GDP (X_2) and the Interest Rate (X_3) towards the Return (Y).

B. Partially Hypothesis Testing (T-test)

The influence of the independent variables over the dependent variable partially determined using T-test.

1.   Oil Price (X_1) influence towards Return (Y)

Hypothesis:

- $H_0: \beta_1 = 0$ Oil Price (X_1) has no significant effect on Return (Y).
  $H_1: \beta_1 \neq 0$ Oil Price (X_1) significantly influence Return (Y).

a = 5%

T_{result} which calculated on the SPSS calculation presented in the following table.

Table 4.8 Partially Hypothesis Testing (T-test)

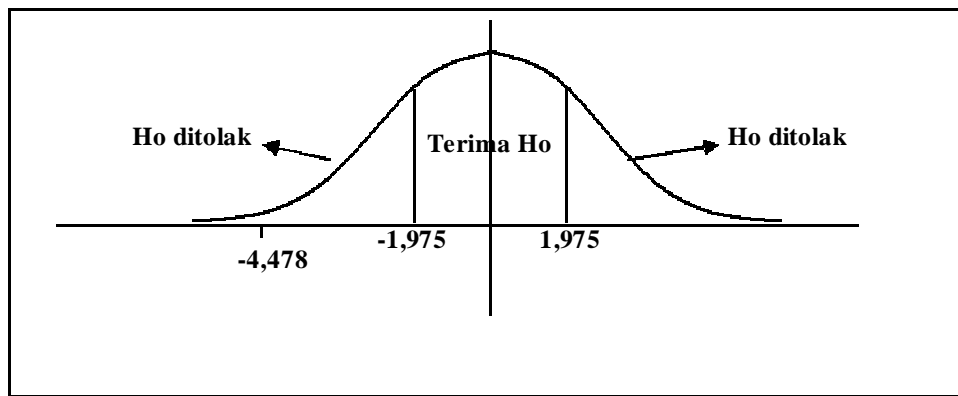| Variable	T-result	df	Ttable	Sig	Description	Conclusion
X1	-4,478	158	1,975	0.000	Ho rejected	Significant

Figure 4.8 Accepted and Rejected Area of Ho of Oil Price (X1) towards Stock Return (Y)

Table 4.8 shows that T test value of X_1 Variable is smaller than the T table value. Because T test value (-4,478) < T table (-1,975), then Ho is rejected. Thus, it can be concluded that partially Oil Price (X_1) significantly influence Return (Y).

2.   GDP Influence (X_2) towards Return (Y)

Hypothesis:

- Ho: $\beta_2 = 0$ GDP (X_1) has no significant effect on Return (Y).
  $H_1: \beta_2 \neq 0$ GDP (X_1) significantly influence Return (Y).

a = 5%

The result of T-test based on the calculation on SPSS is shown on table 4.15

Tabel 4.15 Partially Hypothesis Testing (T-test)

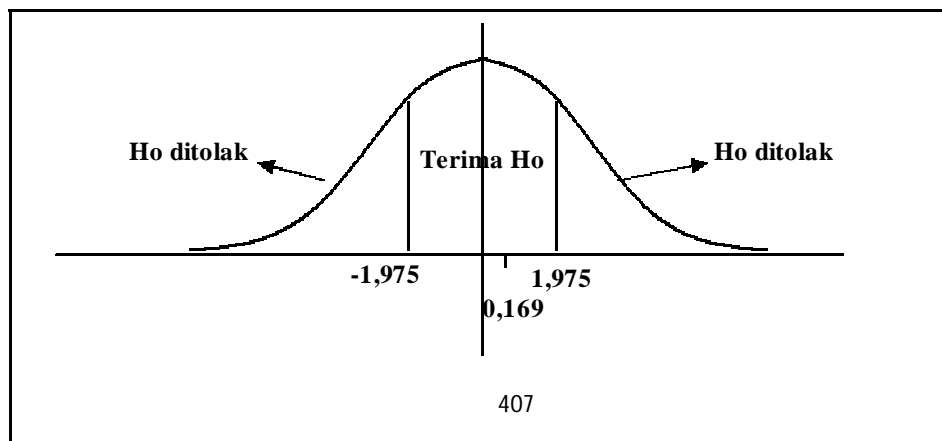| Variable	Tresult	df	Ttable	Sig	Description	Conclusion
X2	0,169	158	1,975	0,866	Ho accepted	Not Significant

Figure 4.8 Accepted and Rejected Area of Ho of GDP (X2) towards Stock Return (Y)

Table 4.15 shows that T test value of X_2 Variable is smaller than the T table value. Because T test value (0,169) < T table (1,975), then Ho is accepted. Thus, it can be concluded that partially GDP (X_2) does not significantly influence Stock Return (Y).

3.　　Interest Rate (X_3) influence towards Return (Y)

Hypothesis:

- H_0: $\beta_3 = 0$　　GDP (X_1) has no significant effect on Return (Y).
  H_1: $\beta_3 ? 0$　　GDP (X_1) significantly influence Return (Y).

$a = 5\%$

The result of T-test based on the calculation on SPSS is shown on table 4.16

Table 4.16 Partially Hypothesis Testing (T-test)

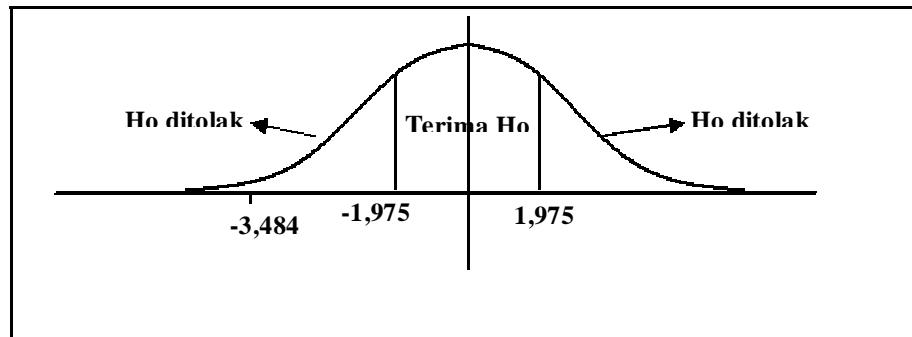| Variable	Tresult	df	Ttable	Sig	Description	Conclusion
X3	-3,484	158	1,975	0,001	Ho rejected	Significant

Figure 4.9 Accepted and Rejected Area of Ho of Interest Rate (X3) towards Stock Return (Y)

Table 4.16 shows that -T result value of X_3 Variable is bigger than the -T table value. Because -T result value (-3,484) < -T table (-1,975), then Ho is rejected. Thus, it can be concluded that partially GDP (X_2) significantly influence Stock Return (Y).

Multiple Linear Regressions

Table 4.17 Analysis of Multiple Linear Regressions

Variable	Coefficient of Regression	Standard Error	t	Sig.
(Constant)	2,921	0,585	4,997	0,000
X1	-0,020	0,004	-4,478	0,000
X2	0,000000011	0,00000006	0,169	0,866
X3	-0,154	0,044	-3,484	0,001

Based on the data on table 4.17, author formed an equation as follow:

$$Y = 2,921 - 0,020\ X_1 + 0,000000011\ X_2 - 0,154\ X_3$$

The sign (positive or negative) of the regression coefficient of the independent variable indicates the direction of the relationship between a corresponding variable and the Return. The regression coefficient for X1 independent variable is negative. It indicates that there is a trade-off relationship

between Oil Price (X 1) and Return (Y). The regression coefficient of the variable X 1 is -0,020. It means that for any Oil Price increase (X 1) of one unit there will be a decrease in Return (Y) of 0,020.The regression coefficient for X2 independent variable is positive. It indicates that there is a unidirectional between GDP (X_2) and Return (Y). The regression coefficient of the variable X_2 is 0,000000011. It means that for any GDP increase (X 2) of one unit there will be a decrease in Return (Y) of 0,000000011.The regression coefficient for X1 independent variable is negative. It indicates that there is a trade-off relationship between Interest Rate (X_3) and Return (Y). The regression coefficient of the variable X_3 is -0,154. It means that for any Interest Rate (X_3) increase of one unit there will be a decrease in Return (Y) of 0,154.

Conclusion

he regression function describes that if value of the oil price, GDP, and interest rate is equal to zero, then stock return's value will be 2,9211. By the equation, it can be conclude that the bigger value of oil price, then stock return will be reduced as 0,020 times the oil price, so does the interest rate. The higher number of interest rate then the value of stock return will be decreased as 0,154 times the value interest rate. Meanwhile, the bigger number of GDP then the value of stock return will be increased as 0,000000011 times the value of GDP. By this equation, it is known that the oil price and interest rate influence stock return the most rather than GDP based on the multiplier value. The recommendation for the investor regarding this topic, author recommends the investors to concern about the Oil price and Interest rate in that period because these factors have higher multiplier value to decrease the value of stock return.

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