Macroeconomic Factors' Effects on the Stock Returns of Manufacturing Companies Listed on the Indonesia Stock Exchange

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ABSTRACT

The purpose of the research is to find a suitable stock return model for manufacturing companies listed on the Indonesia Stock Exchange. Results of data analysis indicate that the several macroeconomic factors simultaneously affect stock returns. Inflation, interest rate, term structure of interest, and exchange rate have negative effects on stock returns, while the lowest corporate income tax positively affects stock returns. The model is able to explain the stock return and thus is useful in predicting stock price changes in the manufacturing industry in Indonesia.

Keywords: Inflation, Interest Rate, Term Structure of Interest, Exchange Rate, Stock Returns.

1. INTRODUCTION

One of the many variables that is used in financial research is stock returns, including other factors that influence it (Tangjitprom, 2012). There are many factors that can influence stock returns, which are internal and external factors. Internal factors such as financial performance which describes the financial condition of a company, and external factors such as exchange rates which may increase the source of external economic disruption (Mariano, 2016). Both may influence the stock returns.

The Indonesian government keeps inviting entrepreneurs and manufacturing industry exporter to synergize with the government in order to do a breakthrough strategy in a short period of time. This is done to increase non-oil and gas export, especially regarding manufacturing industry production of high value-added export product (Ministry of Industry, Republic of Indonesia). With the support from the government, the current situation provides a chance for the manufacturing industry to develop. This development cannot be separated from the need for funds, which can be gained from capital market. Because of this, manufacturing companies that are listed in the Indonesia Stock Exchange need to know the factors which are considered by investors before investing, especially in manufacturer stock.

Many researches about the influence of macroeconomic factor towards stock return have been done in many countries. The result of the researches are acquired without considering the influence of inflation, interest rate, term interest rate and exchange rate to stock return, which show different results.

Compared with other researches, this research has differences which include other macroeconomic factor such as corporate income tax. The information reflected in

the stock return is related to estimated taxable income (Ayers, et. al., 2009). Thus, the purpose of this research is to figure out the investors' reactions to the change of macroeconomic factors such as inflation, interest rate, term interest rate, exchange rate to stock return, and corporate income tax.

2. LITERATURE REVIEW

The theory used in this research is Arbitrage Pricing Theory that was stated by Ross (1976). In this theory, macroeconomic factors that influence stock return are not mentioned. Thus, many researchers later self-interpret by including various macroeconomic factors that are considered influence. The first researchers that test this theory is Chen, Roll, and Ross (1986) who test the influence of macroeconomic factors in the US. Their research showed that, in fact, the influencing factors are unanticipated changes in inflation, term structure of interest rate, risk premium, change in expected inflation, growth rate industrial production to stock return. Other researchers study factors that have influences on stock return in their respective countries. Below are the results of the research that has been done in Asia with different results.

In Pakistan Stock Exchange, Attaulah (2001) tested unexpected inflation, unexpected exchange rate, unexpected crude oil prices, unexpected trade balance, unexpected money supply, unexpected term structure, unexpected industrial production domestic, and unexpected raw material. The research showed that only unexpected inflation, unexpected exchange rate, unexpected crude oil prices, unexpected trade balance are the only factors that influence stock return.

Rjoub et. al. (2009) did some research in Istanbul Stock Exchange from January 2001 until September 2005 and tested the influences of term structure of interest rate, unanticipated inflation, risk premium, exchange rate, money supply and unemployment rate to stock return. The result of their research showed that only term structure of interest rate, unanticipated inflation, risk premium and money supply influence stock return.

In Amman capital market, Ramadan (2012) tested the application of the Arbitrage Pricing Theory model with the data from 2001 to 2011. The variables tested were interest-rate term structure, inflation, money supply and premium risk premium and two additional indicators, which are industry productivity and dividend yield. The research shows there are different influences from every variable among manufacturing industries.

The macroeconomic variables measurement can use the sensitivity of changes in each of these variables. Inflation causes the increase in product and services price. Manufacturing industry that uses raw materials experiences decrease in profit due to the rise of raw material price. Unfortunately, the manufacture industry is not able to directly increase the product's price. The decrement of profit can be responded by investors with stock price changes. Changes in interest of risk free rate will cause change in deposit interest rate. If the deposit interest rate changes, it will cause credit interest rate to change. The credit interest rate can cause changes on cash flow that eventually cause stock price changes. Relevant to sensitivity of change in Term Structure of Interest, if the term structure of interest rate increases due to an increase in government bond interest rate, then company profit will decrease. This happened because the company requires source of fund from external sources and must give higher interest rate than government bond interest rate. The interest of obligation can weigh against the

company, so that will be responded by investor, it can be seen from the share price change (Winarto, 2017). This also applies to exchange rate variable. Since raw material in manufacturing industry is still dominated by raw material from other countries, if there are changes in currency, it can cause changes in raw material price. These changes are able to cause profit margin change in manufacturing industries, which will be responded by investor. Another factor that is also considered is corporate income tax. For tax purposes, a corporation is a separate taxpayer from its shareholders. It means that the corporate entity is subject to taxation on corporate-level (Lederman, 2002). The tax rate determine the corporate profit. Many countries increase their ability to attract greater investment by reducing corporate income tax (Auerbach, et.al., 2007). The decrease in tax rate can decrease corporate expense, which can increase profit. Hence, positive responses are expected from the investors.

3. RESEARCH MODEL AND HYPOTHESIS

Based on concept comprehension and previous empirical researches, the research hypotheses are:

H1: Inflation has a negative influence on the stock return
H2: Interest rate has a negative influence on the stock return
H3: Term strcture of interest has a negative influence on the stock return
H4: Exchange rate has a negative influence on the stock return
H5: The lowest corporate income tax can increase stock return
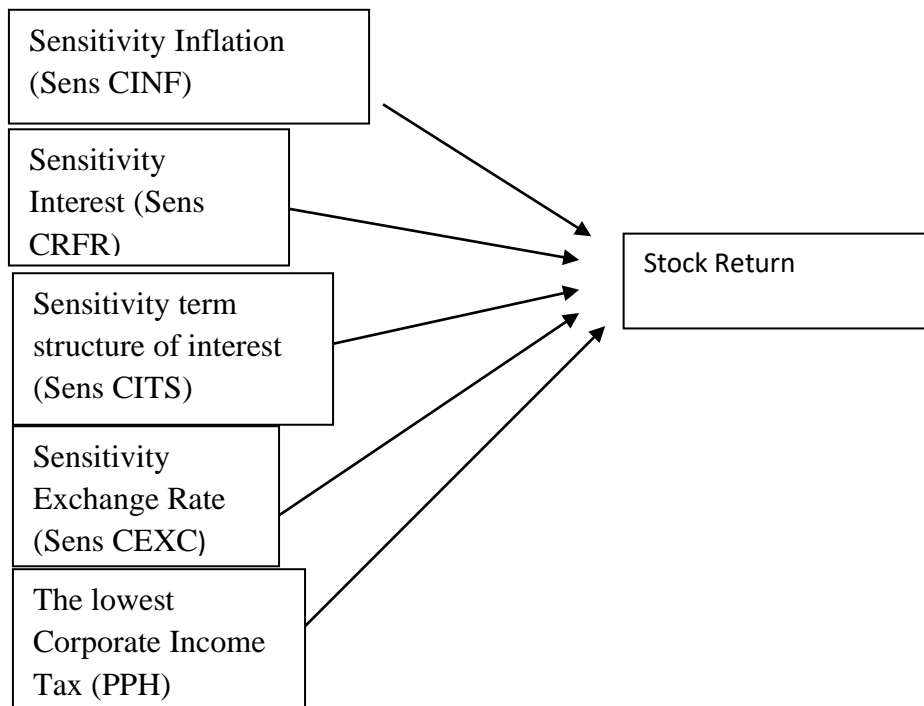
While the research model can be seen at Figure 1.

Figure 1 Research Model

4. DATA AND METHODOLOGY

The population of this research is manufacturing corporates which are listed in Indonesia Stock Exchange consisting of 130 corporates (there are companies that have been established before 2007). Minimum sample are taken with Slovin formula (Cohen and Patricia, 1983):

$$n = \frac{N}{1 + Ne^2} = \frac{130}{1 + 130\ (5\%)^2} = 97$$

The sample is determined and taken through random sampling. The steps of taking the samples are:
1. Every company in the manufacture industry is numbered 1 up to 130.
2. 130 small rolls of paper are numbered 1 up to 130.
3. All the rolls of paper are put in a bowl and scrambled.
4. 97 companies become the sample.

With the consideration that the sensitivity of every company is different, the measuring of macro economic variables used sensitivity proxy, which are:

Sensitivity of Change in Inflation (CINF) = change in stock price: change in inflation
Sensitivity Change in Interest (CRFR) = change in stock price: change in interest
Sensitivity Change in Term Structure of Interest (CITS) = change in stock price: change in Term Structure of Interest
Sensitivity Change in Exchange Rate (CEXC) = change in stock price: change in exchange rate

Dummy variable is used to measure corporate income tax. The year 2007 to 2009 is noted with 0 and 2010 to 2013 is noted with 1. The decrease in tax in this research period starts at 2007 while the point where the tax is in its lowest point is in between 2010 to 2013.

This research will test the influence of inflation, interest rate, term interest rate, exchange rate and corporate income tax to stock returns. Data used is panel data. The research data period is from 2007 to 2013. Regression is applied through one step multivariat regression.

$$R_{it} = \lambda_0 + \lambda_{i1}\ Sens\_CINF_t + \lambda_{i2} Sens\_CRFR_t + \lambda_{i3} Sens\_CITS_t + \lambda_{i4} Sens\_CEXC_t + \lambda_{i5}\ PPH_t + \varepsilon_t$$

This research uses Eviews software. Before regression is applied, classic assumption test is done, which covers normality test, multicollinierity test, heterocedasticity and autocorellation test to make sure BLUE (Best, Linier, Unbiased Estimation). Data processing cannot be done with panel fixed effect model because there is dummy variable, hence pooled model is used.

5. DATA ANALYSIS AND RESULTS

The description data for each macro economy variables can be seen in Table 1. From the year 2007 up to 2013 macroeconomic factors are seen to be fluctuating. The highest inflation happened in year 2008 due to the changes in the price of international comodities, especially oil and food, demand of aggregate, the raise of subsidy fuel (Statistics Central Body, 2017). The highest interest rate of the Indonesian Bank Certificate happened in 2008 due to the global crisis which caused the inflation. The highest interest term structure happened in 2012 which was caused by the uncertainty of global economy. The highest value of exchange rate happened in 2013 due to a high current account deficit which was caused by a high import need. From the year 2007 up to 2009, the income tax of a company is seen to be greater than 25%. However, from the year 2010 onwards, the tax is decreased to 25% which is the lowest for this period. It remained in effect until 2013.

Table 1. The Description Data of Macroeconomic Variables

	2007	2008	2009	2010	2011	2012	2013
Inflation	0.0659	0.1106	0.0278	0.0696	0.0379	0.043	0.0838
Interest Rate	0.0804	0.0861	0.0652	0.048	0.0404	0.045	0.0634
Term Structure of Interest	0.0146	0.0284	0.0283	0.0315	0.0392	0.04	0.0216
Exchange Rate (Rupiah/ US $)	9419	10950	9400	8991	9068	9670	12189
Corporate Income Tax	0.3	0.3	0.28	0.25	0.25	0.25	0.25

Regression model must have BLUE (Best Linear Unbiased Estimation) characteristics and fulfill regression classic assumption, which are normality, non-autocorrelation, and non heteroskedasticity. The notation for every research variables which are processed are in Table 2.

Table 2. Notation for Every Variables

Variable	Code
STOCK RETURN	Y
SENSCINF	X1
SENSCRFR	X2
SENSCITS	X3
SENSCEXC	X4
PPH	X5

The first classic assumption is normality, which means that models must have errors that normally distribute. This assumption is important to fulfill for testing validity parameter with T or F statistic test. Statistics test that is used to test error normality is JarqueBera. The criteria is reject null hypothesis if p.value < 0.05. The result of normality hypotheses test is represented in Figure 2. The result of normality test gives Jarque-Bera score 17929.01 with p.value = 0.0000. The p-value < 0.05 conclude that the error is not normal, and it means that normality assumption is rejected
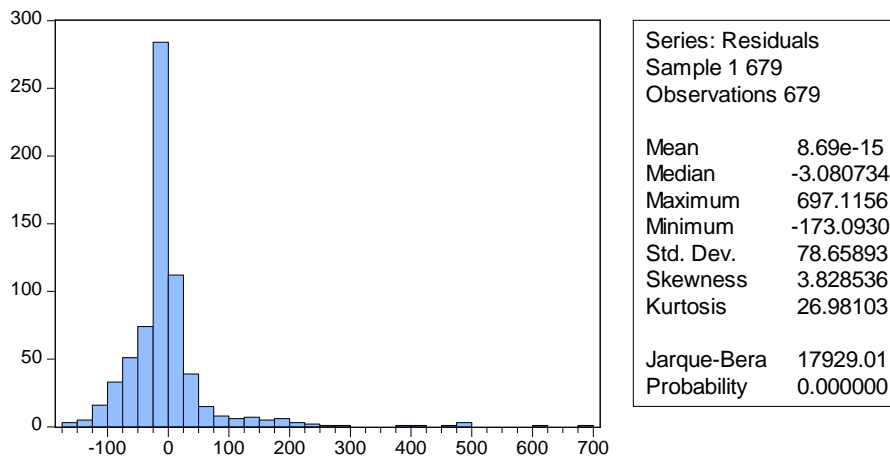
Figure 2. Result of Normality

The next assumption that must be fulfilled is non-autocorrelation, which the non-existence of mistakes among error. The test criteria is reject nul hypotheses if p-value < 0.05. The result of non-autocorrelation (Breusch-Godfrey Serial Correlation LM Test) is shown in Table 3. The result of $nR^2 = 5.735990$ with p-value 0.0166. p-value < 0.05 shows that null hypotheses is rejected. This means that there are autocorrelation and non-autocorrelation assumption is rejected.

Table 3 Autocorrelation Test Results

F-statistic	5.725221	Prob. F (1,672)	0.0170
Obs*R-squared	5.735990	Prob. Chi-Square (1)	0.0166

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Sample: 1 679
Included observations: 679
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.838388	5.122537	-0.358882	0.7198
X1	0.040910	0.506000	0.080849	0.9356
X2	-0.002504	0.111146	-0.022531	0.9820
X3	-0.002410	0.026450	-0.091119	0.9274
X4	-0.009558	0.161140	-0.059313	0.9527
X5	3.093007	6.641975	0.465676	0.6416
RESID(-1)	-0.093969	0.039273	-2.392743	0.0170
R-squared	0.008448	Mean dependent var		8.69E-15

Adjusted R-squared	-0.000405	S.D. dependent var	78.65893
S.E. of regression	78.67487	Akaike info criterion	11.57878
Sum squared resid	4159502.	Schwarz criterion	11.62538
Log likelihood	-3923.996	Hannan-Quinn criter.	11.59682
F-statistic	0.954203	Durbin-Watson stat	2.012706
Prob(F-statistic)	0.455520		

The next assumption to test on is non-heteroscedasticity. This assumption is important to be tested as to guarantee the efficiency of regression model's estimation. The Test Criteria is Reject nul hypothese if p-value < 0.05. The result of non-heteroscedasticity is shown in Table 4. The result of non heteroscedasticity gives score $nR^2 = 26.75906$ with p-value = 0.0001. p-value below 0.05 shows that nul hypotheses is rejected, which shows heteroscedasticity, and it means that non-heteroscedasticity is rejected.

Table 4. Heteroskedasticity Test Results

F-statistic	5.522145	Prob. F(5,673)	0.0001
Obs*R-squared	26.75906	Prob. Chi-Square(5)	0.0001
Scaled explained SS	341.4976	Prob. Chi-Square(5)	0.0000

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Sample: 1 679
Included observations: 679

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1477.640	1995.670	0.740423	0.4593
X1	-275.2332	199.2722	-1.381193	0.1677
X2	-93.70230	43.79429	-2.139601	0.0327
X3	24.52313	10.41474	2.354655	0.0188
X4	-128.2247	63.47675	-2.020026	0.0438
X5	8791.270	2567.184	3.424479	0.0007

R-squared	0.039410	Mean dependent var	6178.115
Adjusted R-squared	0.032273	S.D. dependent var	31514.04
S.E. of regression	31001.35	Akaike info criterion	23.53025
Sum squared resid	6.47E+11	Schwarz criterion	23.57019
Log likelihood	-7982.519	Hannan-Quinn criter.	23.54571
F-statistic	5.522145	Durbin-Watson stat	2.034710
Prob(F-statistic)	0.000054		

Non-multicollinierity is the presence of strong relation between independent variables. The presence of multicollinierity causes parameter estimation to be

inefficient. To test the multicollinierity, Variance Inflation Factor (VIF) can be used. The VIF value < 10 shows there is no multicollinierity. The result of VIF is shown Table 5. The result of analysis shows all VIF < 10 . Hence, there is no violation of non-multicollinierity and it means that non-multicollinierity is accepted.

Table 5.   Multicollinierity Test Results

Variable	Coefficient
X1	1.304
X2	9.963
X3	1.229
X4	9.515
X5	1.140

The existence of violation on normality, non-heteroscedasticity, and non-autocorellation assumption forces the model to be created through robust approach. The robust standard error   model is done with Newey-West HAC Standard Errors & Covariance Methodwith the result in Table 6.

Table 6. Robust Standard Error Model
Dependent Variable: Y
Method: Least Squares
Sample: 1 679
Included observations: 679
Newey-West HAC Standard Errors & Covariance (lag truncation=6)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.057648	2.459526	0.836604	0.4031
X1	-3.870955	0.667853	-5.796121	0.0000
X2	-1.992559	0.564943	-3.527009	0.0004
X3	-0.351829	0.050696	-6.939918	0.0000
X4	-1.836412	0.874854	-2.099106	0.0362
X5	29.36598	4.834550	6.074191	0.0000

R-squared	0.574535	Mean dependent var	35.80403
Adjusted R-squared	0.571374	S.D. dependent var	120.5914
S.E. of regression	78.95058	Akaike info criterion	11.58432
Sum squared resid	4194940.	Schwarz criterion	11.62427
Log likelihood	-3926.876	Hannan-Quinn criter.	11.59978
F-statistic	181.7600	Durbin-Watson stat	2.179615
Prob(F-statistic)	0.000000		

The result give the regression robust model as follows:

$$\hat{y} = 2.057648 - 3.870955X1 - 1.992559X2 - 0.351829X3 - 1.836412X4 + 29.36598X5 + e$$

The result of hypothesis shows that all variables significant affect stock return variables (Y) with p-value < 0.05. Determination coefficient is 0.574535 shows that 57,45% of variation from stock return is explained by variables X1=SENSCINF, X2=SENSCRFR, X3=SENSCITS, X4=SENSCEXC, dan X5=PPH.

The result of the data processing shows that the macroeconomy factors simultaneously affect stock returns with a contribution 57,45%. The test of each macroeconomic factors also shows that inflation, risk free rate, term structure of interest, exchange rate affects stock return negatively, while the lowest income tax of companies increase stock return. These cases also show that the result of this research is in accordance with the initial hypothesis of the research.

6. CONCLUSION

Result of the research shows that:
- Inflation has negative influence on the stock return.
- Interest rate has negative influence on the stock return.
- Term structure of interest has negative influence on the stock return.
- Exchange rate has negative influence on the stock return.
- The lowest corporate income tax increase stock return.

This research results show that this model has the ability to explain stock return to manufacturing industry in Indonesia. It can be concluded that this model is suitable for manufacturing industry in Indonesia. This model can also be used to predict the changes of stock price in manufacturing industry because the model has R–squared 0.5745. The R-squared obtained, which is 0,5745, shows that there are other factors that can be considered that can influence manufacturer industry stock return in Indonesia, hence further research may include the other factors.

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