

The Influence of Exchange Rate and Inflation on Stock Return Volatility

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Abstract

Analysis of the effect of exchange rates and inflation on volatility and stock returns on the Indonesia Stock Exchange. The stock sector to be studied is the trade, services and investment sector in the 2015-2017 period. In this case, what will be discussed about the relationship and influence of inflation and exchange rates on volatility and stock returns? Based on the results of this study, future investors are more aware of what factors influence the volatility of stock returns, so that when investing in prospective investors did not experience losses. The exchange rate is the value of a foreign currency that is converted into the agreed value of the domestic currency. The exchange rate changes every time between supply and demand of the currency. Inflation is one indicator that influences changes in stock prices and returns. Inflation is a general price increase, or inflation can also be said to be a decrease in the purchasing power of money. The higher the price increase, the lower the value of money. This must also be considered by an investor if he wants to invest. Based on the data that the volatility of all shares in the three years namely, the period of 2015 to 2017 tends to be negative.

Keywords: *Exchange Rates, Inflation, Stock Return, Volatility*

Jel Classification: G1, G11, G12, G13, G14

1. INTRODUCTION

In making an investment, an investor wants to get an appropriate return. Return is the level of profit enjoyed by investors over an investment that is made. Without the level of profit enjoyed from an investment, surely an investor will not invest. So the goal of investors in investing is to want to get profits referred to as stock returns both directly and indirectly (Takagi, S. 2014).

In stock investing, an investor not only calculates returns but there are risks that must be considered. Because the return and risk of a unity are inseparable, such as the saying of high-risk high return. Both have a positive relationship, the finer the return, the finer the risk. For the calculation, the risk of bias is indicated by the standard deviation, and the return is indicated by the expected return.

Changes in return are the things that most investors pay attention to. Returns will occur if the shock occurs in the company or from the country's economy. Shock that occurs affects the volatility of the stock return. Volatility is the wide range of fluctuations in the price of a stock, gold or other commodities. Every time the price is always changing in supply and demand. Volatility gives investors an idea to decide to buy or sell shares. An investment is not only done by local investors, but foreign investors also invest in the country. With the presence of foreign investors, foreign investors indirectly need local money to be able to buy the shares. Investors must buy it according to the prevailing exchange rate in the country.

2. LITERATURE REVIEW

2.1. Inflation

Ouyang, and Rajan (2016) provides a definition that inflation is a condition where there is an increase in the general price level, both goods, services and factors of production. From this, definition indicates a weakening state of purchasing power, which is followed by the increasingly declining real (intrinsic) value of a country's currency. Inflation itself is a process of existing events, where inflation is considered to occur if the process of price increases takes place continuously and influenced each other. According to Ostry, Ghosh, and Chamon (2015), the price increase of just one or two items is not called inflation. Inflation itself is a process of existing events where inflation is considered to occur if the process of price increases takes place continuously and affects each other. There are three indicators commonly used to measure the level of inflation that occurs, namely (Aba and Magdalena (2018).: (1). Gross Domestic Product (GDP) Deflator, which is the measurement of the price level obtained by dividing nominal GDP with real GDP. GDP deflator is one indicator of inflation, because the GDP deflator is a broad-based price index based on calculations containing all goods produced in the economy; (2). Consumer Price Index (CPI), which is an index that measures the average cost of certain goods purchased by consumers. (3). Producer Price Index (IHP), which is an index that measures price levels of the producer stage based on net sales of each commodity.

2.2 Types of Inflation

According to its magnitude, Mishkin (2008) classified inflation into three parts, namely:

(1). Low inflation, which is single digit inflation characterized by price increases that are slowly and predictably.

In this inflation range, people still believe and want to hold money;
(2). Inflation soars, namely double-digit inflation or even three digits defined between 20 - 200%. In this condition, money loses its value very quickly, so the community only holds a small amount of money needed for everyday transactions; (3). Hyperinflation, namely inflation above 200% per annum. In this condition, the community no longer believes in the value of money and chooses to spend money and store it in goods.

2.3 Exchange Rates

According to Mohanty and Berger (2013), the exchange rate is an exchange between two different currencies, which is a comparison of the value or price between the two currencies. According to Shah et al; (2009), the exchange rate is a comparison between the price of a country's currency and another country's currency. For example, the dollar exchange rate against the Indonesia Rupiah (IDR) shows how much the dollar exchange rate against the IDR. According to Rime., Sarno., and Sojli (2010) the regional exchange rate against foreigners has a negative influence on the economy and capital markets. The decline in the regional exchange rate against foreigners resulted in the import costs of raw materials that would be used for production and also increased interest rates. Factors that influence currency exchange rate movements:(1). Differences in inflation rates between two countries; A country with a consistently low inflation rate will have a stronger exchange rate than a country with a higher inflation. The purchasing power of these currencies is relatively larger than in other countries. The high inflation rate of the country's currency will depreciate; (2). Differences in interest rates; A change in interest rates, a country's central bank can affect inflation, and currency exchanges rates. If inflation is high, investors will exit until the central bank's central bank raises interest rates again; (3). Export price ratios and import prices; If the export price rises faster than the import price, the country's currency exchange rate tends to strengthen; (4). Political and economic stability; Investors are certainly looking for countries with political systems and good economic performance and stable political conditions.

2.4 Stock Return

According to Neely (2008), stock returns are also referred to as stock revenues and are changes in the value of the period t share price with $t-1$. And that means that the higher the stock price changes, the higher the return will be Seerattan and Spagnolo (2009) suggests that stock returns are "return is yield and capital gain (lost)".

According to Menkhoff., et al: (2016) there are two types of returns, namely: "Return realization (realized return) is the return that has occurred. This return is calculated using historical data. Realization of returns is important because it is used as one measure of company performance. Return realization is also useful in determining the expected return and future risks. " From the above definition, theory can be concluded that the type of return consists of: (1). Return Realization; Return realization is the return that has occurred, and the calculation uses company history data that is useful for measuring company performance. Realization of return or also called historical return is also useful to determine the expected return and risk in the future; (2). Returns Expectations; This return is used for investment decisions. Return is more important than historical return (realization) because this return is expected by all investors in the future.

2.5 Volatility

According to Kim., Kortian, and Sheen (2000) in the Capital Market Volatility Study Team that: "Volatility is a statistical measurement of price fluctuations in a security or commodity for a certain period." According to mathematical expert at Kim and Sheen (2006) that: "Volatility is the annual standard of daily income." According to Katusiime, Agbola, and Shamsuddin (2016) that: "Volatility is an important variable when assessing option prices." Based on some of the above explanation it can be concluded that volatility is a measure of price changes and is often used to see the rise and fall of stock prices. Based on some of the explanations above it can be concluded that volatility is a measure of price changes and is eventually used to see the rise and fall of stock prices.

3. RESEARCH METHODS

This research is a type of associative research with causal relationships where there are independent and bound variables. Judging from the data obtained, this research is a type of quantitative research because it refers to the calculation of research data in the form of numbers. This research variable includes dependent and independent variables. (1). Dependent variable (Y) is a type of dependent variable that is explained or influenced by an independent variable. In this study, the Dependent variable is Stock Return at the end of the year and volatility. (2). Independent variables (X) or independent variables are variables that are not influenced or not dependent on other variables (MacKinnon, Haug, and Michellis (1999).

In this study the independent variables / independent variables are: (a). Inflation (X1) Inflation is an inflation rate that occurs at the close of the year. Inflation data is data from the Central Statistics Agency or from Bank Indonesia (BI); (b). Exchange of Rupiah (X2) Exchange Rate of Rupiah against US Dollar is the IDR Exchange Rate that occurred at the close of the year. This data is obtained from Bank Indonesia (BI).

The data used in this study is secondary data, which means that the data that is available is not obtained by conducting observations or research directly to the object being researched. The data sources used for this study were obtained from the official website of the Indonesia Stock Exchange, www.idx.co.id, the Central Bureau of Statistics, namely www.bps.go.id, the official website of Bank Indonesia, www.bi.go.id, and Yahoo's finance.

Data Collection The data collection used in this study was obtained in two ways, namely: (a). Documentation Study Documentation study is a data collection technique that is not directly addressed to the research subject. Documents can be divided into primary documents (documents that are written by people who directly experience an event), and secondary documents (if the event is reported to another person who is then written by this person). When using this method as a method of data collection, researchers can use existing data by simply making copies or duplicating them; (b). Research Library This method is done by collecting material or data related to the object to be studied. This method can be done by studying, studying and analyzing various kinds of literature such as books, journals, newspapers, and various other written sources related to the object to be studied.

Data analysis methods are carried out by analyzing directly by understanding existing data, as for the following forms of testing: (1). Classic Assumption Test; The Multiple Regression Model explained earlier must fulfill the classical assumption requirements which include: (a). Normality test; The normality test is done to test whether in a regression model, the independent and dependent variables or both have normal distribution or not. The best model is normal or near normal data distribution. Data normality can be detected by looking at the shape of the histogram curve with a balanced slope left and right and shaped like a bell or by looking at data points that spread around the diagonal line and in the direction following the diagonal line of the Normal P-Plot image (Kearns and Rigobon (2005); (b). Multicollinearity Test; This test is used to test whether a regression model has found a correlation between independent variables. If there is a correlation, then there is a multicollinearity problem. A good regression model should not have a correlation between independent variables. Testing of the presence or absence of multicollinearity is done by the VIF (Variance Inflation Factor) method with the provisions: If $VIF > 10$ there is a multicollinearity problem If $VIF < 10$, there is no multicollinearity problem; (c). Autocorrelation Test: The autocorrelation assumption test aims to test whether in a linear regression model, there is a correlation between confounding errors in period t with confounding errors in period $t-1$ (Katusiime, Shamsuddin and Agbola. 2015a). A good regression model, autocorrelation does not occur. To diagnose the existence of autocorrelation in a regression model, testing of the Durbin Watson test value was carried out. According to Katusiime, Shamsuddin, and Agbola (2015b), decision making is, whether or not there is autocorrelation, as follows: 1) The DW number is below -2 , meaning there is a positive autocorrelation 2) The DW number is between -2 to $+2$, meaning there is no autocorrelation, the DW number above $+2$, means there is a negative autocorrelation; (d). Heterocedasticity test; Heterocephalic is a confounding variable which has a variant that is different from one observation to another or variant between independent variables are different, this violates the assumption of homoscedasticity that each explanatory variable has the same variance (constant). Heterocephalic test can be done by Glejser Test, which is by looking at the significance value above the level of $\alpha = 5\%$, so that it can be concluded that the regression model does not contain any heterocephalic (Guimarães and Karacadag; 2004).

Bivariate Analysis (Simple Linear Regression) is used to measure the correlation coefficient between three variables, namely the first, second, and third hypotheses, which are divided into three stages. The first step is to do simple linear regression between the variables of Inflation on Stock Returns. The second stage is between the variable inflation on Stock Returns. Whereas the last one is between the Exchange Rate variable and the Stock Return. To test the first hypothesis up to the fourth hypothesis using simple linear analysis. Simple linear regression analysis is used to estimate or predict the value of the dependent variable if the value of the independent variable is increased or decreased. This analysis is based on the relationship of one dependent variable with one independent variable Goyal and Arora (2012).

Simple linear regression equation as follows:

$$Y = a + bX$$

Description: Y = dependent variable predicted (stock return) and volatility a = constant price (if price Y and $X = 0$) b = price regression coefficient X = independent variable that has a certain value (inflation and Rupiah exchange rate).

Multiple Linear Regressions are used to test the fourth hypothesis, namely to find the influence between Inflation and Exchange Rate on Stock Returns and volatility. This analysis is used to find the functional relationship of all predictors with the criteria. In addition, to determine the magnitude of the predictor variable contribution to the criteria, both relative donations, and effective contributions. Multiple linear regressions is used to determine the effect of independent variables on dependent variables, namely: Inflation rate and Rupiah Exchange Rate on Stock Returns of banking companies listing on the Indonesia Stock Exchange.

The hypothesis testing is done by the following steps: (a). Partial Test (t test); Reliability of multiple regressions as an estimation tool is largely determined by the significance of the parameters which in this case are the regression coefficients. The t test is used to test the regression coefficient partially from its independent variable. The formulation of the t test is as follows: (1). If significant $t \text{ count} \geq t \text{ table}$, then H_0 is rejected, which

means that the independent variable partially has a significant effect on the dependent variable; (2). If significant t count b. Simultaneous Test (F test) Test the significance of multiple regressions with test. F-statistic test used to examine the effect of all independent variables together (simultaneously) on the dependent regressions. Formula F Test as stated by (Ghosh, Ostry, and Chamon; 2016) as follows: The F test formulation is as follows: If significant F counts \geq Ftable, then H_0 is rejected, which means that the independent variables simultaneously significantly influence the dependent variable. - If significant F count.

4. RESULTS

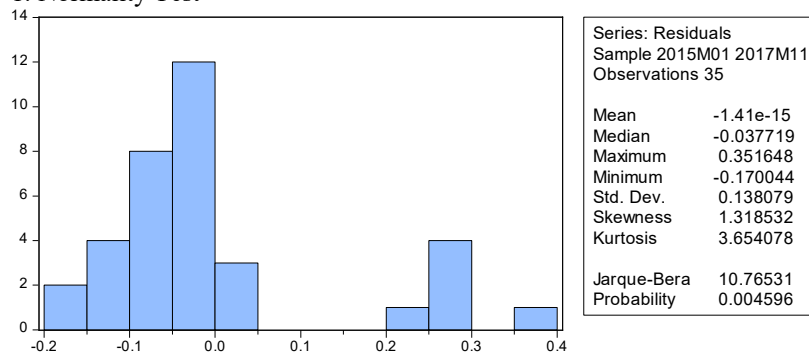
Describe Exchange Rate Variables (X1); It is known that in 2015 the IDR exchange rate in September was IDR.14,650 per USD, the lowest in January was IDR.12,688 per USD, and the average IDR exchange rate in 2015 was IDR.13,477. For further data, the highest exchange rate in 2016 is in January of IDR.13,775 per USD, the lowest in October of IDR.13,048 per USD and an average of IDR.13,330.7.

Descriptive Inflation Variables (X2); The highest inflation value occurred in July amounting to 0.044; the lowest inflation value occurred in February amounting to 0.033 and the average inflation value of 0.038. For 2016, the highest inflation rate occurred in October at 0.045; the lowest inflation rate in May was 0.028, and the average inflation rate was 0.035.

Descriptive Variable Volatility of stock returns; Volatility of all shares in these three years tends to be negative. In 2015, the highest level of volatility occurred in October with a value of 0.012; the lowest level of volatility in April was -1.569, and the average level of volatility was -0.7734. In 2016, the highest level of volatility in March was -0.0039, the lowest level of volatility in October was -2.123 and the average level of volatility was -0.7734. In 2017, the highest level of volatility occurred in February at -0.003, the lowest level of volatility in July was -1.908 and the average level of volatility was -1.214.

A. Classic Assumption Test

1. Normality Test



Decision making hypothesis:

H_0 = If the probability value > 0.05 , then it can be said that the residuals are normally distributed.

H_1 = If the probability value is < 0.05 , it can be said that the residuals are not normally distributed. Based on the table above it can be seen that the probability value is 0.004596, which meant that the probability value < 0.05 can be said that the data is not normally distributed.

2. Multicollinearity Test

	Stock Returns	Exchange Rate	Inflation
STOCK RETURNS	1	0.024	0.027
EXCHANGE RATE	0.024	1	0.046
INFLATION	0.027	0.047	1

Based on the results of the multicollinearity test, the table above is an estimate of the estimation of independent and dependent variables, namely stock returns, inflation and exchange rates. How to find out whether or not there is multicollinearity in this study by looking at the correlation matrix. A data that has multicollinearity if the correlation value between independent variables is smaller than 0.8. The table above explains that the data does not have a multicollinearity problem because the correlation between variables is smaller than 0.8.

3. Autocorrelation Test

Dependent Variable: STOCK RETURN				
Method: Least Squares				
Date: 05/21/18 Time: 15:25				
Sample: 2015M01 2017M11				
Included observations: 35				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-6.207430	8.870129	-0.699813	0.4891
Inflation	0.200093	1.669428	0.119857	0.9053
Exchange Rate	1.513644	2.150123	0.703980	0.4865
R-squared	0.015957	Mean dependent var		0.048192
Adjusted R-squared	-0.045546	S.D. dependent var		0.139194
S.E. of regression	0.142329	Akaike info criterion		-0.979537
Sum squared resid	0.648240	Schwarz criterion		-0.846222
Log likelihood	20.14191	Hannan-Quinn criter.		-0.933517
F-statistic	0.259452	Durbin-Watson stat		2.756801
Prob(F-statistic)	0.773081			

Based on the results of the calculations above it can be obtained that the DW value is 2.757. according to the decision criteria that zero DW between -2 to +2 means there is no autocorrelation. It can be concluded that the data shows autocorrelation.

4. Heterocedasticity test

Heteroskedasticity Test: White				
F-statistic	1.190126	Prob. F(2,32)	0.3173	
Obs*R-squared	2.423159	Prob. Chi-Square(2)	0.2977	
Scaled explained SS	2.688001	Prob. Chi-Square(2)	0.2608	
Test Equation:				
Dependent Variable: RESID^2				
Method: Least Squares				
Date: 05/21/18 Time: 15:35				
Sample: 2015M01 2017M11				
Included observations: 35				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.290196	0.946865	-1.362598	0.1825
INFLATION^2	-2.459190	3.449525	-0.712907	0.4811
Exchange Rate ^2	0.077166	0.055606	1.387721	0.1748
R-squared	0.069233	Mean dependent var		0.018521
Adjusted R-squared	0.011060	S.D. dependent var		0.030614
S.E. of regression	0.030444	Akaike info criterion		-4.064030
Sum squared resid	0.029659	Schwarz criterion		-3.930714
Log likelihood	74.12052	Hannan-Quinn criter.		-4.018009
F-statistic	1.190126	Durbin-Watson stat		2.275590
Prob(F-statistic)	0.317289			

Based on the table above it can be seen that the probability is > 0.05 which means that the data is not heteroscedasticity

B. Hypothesis Testing

1. Partial Test (t)

Dependent Variable: STOCK RETURN				
Method: Least Squares				
Date: 05/21/18 Time: 15:50				
Sample: 2015M01 2017M11				
Included observations: 35				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-6.207430	8.870129	-0.699813	0.4891
Exchange Rate	1.513644	2.150123	0.703980	0.4865
INFLATION	0.200093	1.669428	0.119857	0.9053
R-squared	0.015957	Mean dependent var		0.048192
Adjusted R-squared	-0.045546	S.D. dependent var		0.139194
S.E. of regression	0.142329	Akaike info criterion		-0.979537
Sum squared resid	0.648240	Schwarz criterion		-0.846222
Log likelihood	20.14191	Hannan-Quinn criter.		-0.933517
F-statistic	0.259452	Durbin-Watson stat		2.756801
Prob(F-statistic)	0.773081			

If significant $t\text{-count} \geq t$ table, then H_0 is rejected, which means that the independent variable partially has a significant effect on the dependent variable. If significant $t\text{-count}$ based on the calculation of the table above that the exchange rate has a $t\text{-count}$ value of 0.703980, which value is smaller than the $t\text{-table}$ of 1.6906. This means that the exchange rate does not affect the volatility of stock returns. While $t\text{-count}$ for inflation has a value of 0.119857 $<$ 1.6906 which indicated that inflation did not affect the volatility of the stock return.

2. Test F

Tests on regression coefficients are simultaneously carried out with the F Test. This test is conducted to find out all the independent variables contained in the model together with the independent variables. With a significant level of 5%, the F value of each regression coefficient is then compared with F table. Based on F table with $\text{prob.sig} = 5\%$ $df_1 = (3-1 = 2)$, $df_2 = (35-3 = 32)$ the results obtained are 3.29. While F arithmetic has a value of 0.259452, which means F count.

5. CONCLUSION

Investment development from time to time is very good in the community. The community has begun to open up to make investments, especially investments in stocks. This makes the role of the capital market as a place to get funds from outside parties to increase. Volatility of stock returns with inflation and exchange rates has a positive relationship. Both variables do not have a significant relationship to volatility. In previous studies said that the exchange rate did not affect the volatility of stock returns. However, research says the exchange rate can indirectly affect stock returns. Inflation is not significant for stock returns; this is evidenced by the existence of previous research. Inflation is a process of continuously increasing the price of goods and making the value of the currency decline.

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