The Effect of Foreign Exchange Rate, Inflation Rate and Market Return on Return of Bank Perseros' Stock

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Abstract—*Stock return is affected by many factors, among others are: macro economics environments, political condition, fundamental corporate performance, financial market condition, etc. The purpose of this study is to determine the effect of foreign exchange rate, inflation rate and market return on bank perseros' stock (government owned banks). We take the case of bank perseros' because those banks are among the biggest banks in Indonesia in terms of capital. Our observation period starts from January 2010 to September 2014. This period of observation is chosen because it was after the crisis of 2008 and therefore during the time the effect of the crisis on Indonesia's financial market was mild. Due to the IPO of Bank Tabungan Negara was in the late year of 2009, therefore our period of research run from January 2010 until September 2014.Our justification to use the foreign exchange rate, inflation rate and market return as independent variable is because the foreign exchange rate, inflation rate are considered to be macro economics variable, and market return is financial market variable. The data used in this study is monthly secondary data of stock price data of bank perseros', the foreign exchange rate, inflation rate and market return. In this study, the independent variables used are the foreign exchange rate (X_1), inflation rate (X_2) and market return (X_3), while the dependent variable used is return of bank perseros' stock (Y). Result of study shows that the regression function is: $Y = -0.036 + 0.0000033 X_1 + 0.046 X_2 + 1.531 X_3$. The test of hypothesis in this study shows that simultaneously the foreign exchange rate (X_1), inflation rate (X_2) and market return (X_3) have significant effect on return of bank perseros' stock (Y). This is shown by sig. F = 0.000 < 5% (α). Partially the effect of foreign exchange rate and inflation rate on return of bank perseros' stock are not significant, these are shown by p-value of X_1 = 0.468 and p-value of X_2 = 0.89 which are greater than α of 5%. Whereas the market return has significant partial effect on return of bank perseros' stock, the p-value is 0.000. The effect of independent variable on return stock simultaneously is 53.1%. Whereas partial effect of each X_1, X_2 and X_3 is 0.24%, 0.0081% and 52.27% The conclusion of the study is: macro economics and financial markets simultaneously have effect on return of bank perseros' stock. However the financial market variable has much greater effect compare to the other variables*.

Keywords— *foreign exchange rates, inflation rates, market return, stock return, bank perseros*

I. INTRODUCTION

Price of a corporate stock is affected by so many factors. Those factors, among others, are the conditions of: internal performance of the corporate, financial market, micro and macro economics, politic, globalization, investors' psychology, etc. In this study, we decided to focus on macro economics and financial market conditions as main factors that affected stock price. We believe that in the cases of Indonesia, economics and financial market condition have a relatively greater impact on stock price in the long run compare to the other factors mentioned above.

During 2007-2008 The U.S. financial system has been in turmoil. Credit conditions have tightened and asset values have declined, contributing substantially, in turn, to the weakening of economic activity.(www.federalreserve.gov/newsevent/speech/bernake/20081204). The weakening condition of US financial system had contagion effect to other countries' financial market. In Indonesia, after the crisis of 2008 there were: one commercial bank closed (Bank IFI), one bank was bail out (Bank Century) and 9 bank perkreditan rakyat (BPR) were closed. (bisnis.news.viva.co.id). Based on this condition, we are interested in writing about banking industry after the year of 2008. We take the case of bank perseros' because those banks are among the biggest banks in Indonesia in terms of capital. Our observation period starts from January 2010 to September 2014. This period of observation is chosen because it was after the crisis of 2008 and therefore during the time the effect of the crisis on Indonesia's financial market was mild. Due to the IPO of Bank Tabungan Negara was in the late year of 2009, therefore our period of research run from January 2010 until September 2014.

From point of view of investors, foreign exchange rate of US$ to Rupiah can be considered to be one alternatives of investment for them. Since Indonesia use floating exchange rate policy, there is opportunity to gain return as well as get risk in investing in the foreign exchange market. The U.S. dollar has been the focal point of most currency trading since

the 1940s. As a result, most of the world's currencies have been quoted against the dollar. Inflation rate is one factor that causes decreasing value of money, to overcome this problem, usually household has to invest their money in other form of financial instrument, such as stock. The performance of individual stock in the market is affected by the performance of market. The market's performance is usually measured by composite index.

Based on the above explanation, the purpose of this study is to determine the effect of foreign exchange rate, inflation rate and market return on bank perseros' stock (government owned banks)

II. THEORETICAL FRAMEWORKS

Main source of profit for commercial in general come from interest income. From an economic point of view, the interest rate is the price of borrowing or lending money. Rate of interest is the opportunity cost of holding money. Rate of interest is influenced by maturity, risk, tax status, liquidity, inflation rate, default risk, etc. The interest rate is negatively related to the price of the asset. When interest rates rise, asset prices decrease and when interest rates decrease, the price of the asset rises. [5].

The inflation rate is the annual percentage change of the price level. Price level is calculated by Consumer Price Index. Unpredictable inflation rate is a problem, because it redistributes income and wealth, lowers real GDP and employment, and diverts resources from production. Unpredictable changes in the inflation rate redistribute income in arbitrary ways between employers and workers and between borrowers and lenders. A high inflation rate is a problem because it diverts resources from productive activities to inflation forecasting. From a social perspective, this waste of resources is a cost of inflation. [4]

The Fisher effect, states that nominal interest rates in each country are equal to the required real rate of return plus compensation for expected inflation. This is derived from

$$(1 + r)(1 + \pi) - 1:$$
$$r + \pi + r\pi$$
$$i \qquad\qquad (1)$$

Where i is the nominal rate of interest, r is the real rate of interest, and π is the expected rate of inflation over the period of time for which funds are to be lent. [2].

From the above citation, it is clear that inflation is one among many factors that have influenced over rate of interest. Since interest income is the main source of bank income, inflation is expected to have influence on banks' stock price.

Studies of macroeconomics impact on stock return have been conducted by many researchers. [9]. study said that exchange rate and money supply influenced stock price showed positive correlation. They found that one percent changes in foreign exchange of RMB against the US dollar causes 32% change in Shanghai stock market index in the long

run, while one percent changes in foreign exchange of RMB against Hong Kong dollar result in 38% change in stock index.

Research on macroeconomics factor and stock exchange: Evidence from Taiwan [6]. found that exchange rate and GDP seem to affect return of all portfolio stock, while inflation rate, exchange rate and money supply were having negative relationship with return for portfolio stock of big and medium company.

[8]. studied the partial effect of Rp/USD, interest rate and inflation rate to stock price in multiple regression model of $\hat{Y} = 26.629,937 - 2,311X_1 - 246,069X_2 + 144,975X_3$. He revealed that Rp/USD and interest rate had a negative effect to stock price and on the other hand inflation rate had a positive effect to stock price.

[7]. were analyzing the effect of SBI's rate, inflation rate and ROE to stock's price of bank perseros'. They found the effect of inflation rate on stock prices has a negative coefficient of -4.726525 that means every 1% increase of the rate of inflation may decrease the stock price of 4.72 %. All independent variables, SBI interest rate, inflation, ROE jointly have a significant effect on the dependent variable stock market prices, because the F statistics obtained 266.31 > F table 2.68.

III. RESEARCH METHOD

This study use quantitative method using time series monthly data from January 2010 to September 2014.

1. Stock's rate of return.

Return is calculated by reducing closing price t period with t-1 period; add it with dividend paid then divided it with closing price t-1period (Ross et.al, 2010)

$$Ri = \frac{(P_t - P_{t-1}) + D_t}{P_{t-1}} \qquad (2)$$

Where:

R_i	= realized return
P_t	= Price of stock period t
P_{t-1}	= Price of stock period t-1
D_t	= dividend at period t

2. Foreign exchange rate, Inflation rate, and market return

In this study we use monthly data of foreign exchange rate of Rupiah against US dollar, using ask price.

The major purpose of the CPI is to measure inflation rate. The inflation rate is the percentage change in the price level from one year to the next. The inflation formula is calculated as follow ([1], 2010).: Inflation rate = [(CPI this year – CPI last year) ÷ CPI last year] × 100.

Market rate of return

In this study we use monthly data IDX composite index.

Market rate of return is calculated from return of the composite index (IHSG) [3]

$$Rm, t = \frac{IHSG_t - IHSG_{t-1}}{IHSG_{t-1}} \qquad (3)$$

Where:

Rm = market return return at period t

$IHSG_t$ = composite index at period t

$IHSG_{t-1}$ = composite index at period t-1

3. Statistical method

We use multiple regression model. The independent variables used are the foreign exchange rate (X_1), inflation rate (X_2) and market return (X_3), while the dependent variable used is return of bank perseros' stock (Y). [1]

$$\hat{Y} = a + b_1X_1 + b_2X_2 + b_3X_{3\ldots\ldots\ldots} \qquad (4)$$

Whe Where:

$\hat{Y}$ = stock return of Bank Persero

X_1 = foreign exchange rate

X_2 = inflation rate

X_3 = market return

a = Intercept

$b_1, b_2\ b_3$ = regression coefficient.

The null and alternative hypotheses

Ho: $\beta_{1,2,3} = 0$.

(foreign exchange rate (X_1), inflation rate (X_2) and market return (X_3) simultaneously do not have significant effect on return of bank perseros' stock (Y)).

Ha: $\beta_{1,2,3} \neq 0$.

(foreign exchange rate (X_1), inflation rate (X_2) and market return (X_3) simultaneously have significant effect on return of bank perseros' stock (Y)).

We also calculated coefficient of multiple determination, coefficient of correlation, and partial F-test criterion.

IV. RESULT OF THE STUDY

Sample data in this study is monthly data of stock return of BBTN, BMRI, BBNI, BBRI, foreign exchange rate, inflation rate and market return from January 2010 to September 2014.

Graphical Analysis of Research Variables

The graph below showed that the stock return of BBTN, BMRI, BBNI and BBRI fluctuate in a relatively the same pattern during 2011 until first semester of 2014. In the year of 2010 BBNI stock return is the lowest among the four banks' stock return, whereas the return of BBTN is the highest. Another exception seems appear during the year 2012 where the stock return of BMRI had relative higher increase compare to the other stocks. The return of BBTN stock early when its IPO showed different pattern from other bank perseros' stock return but start from January 2011 the BBTN stock return move toward the same pattern with the other.
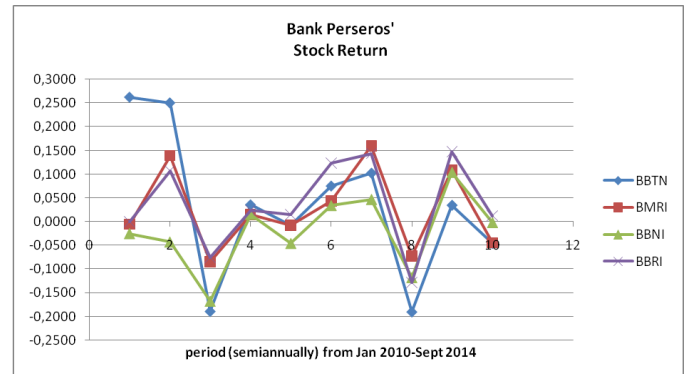

During the period of 2010 until 2013, the inflation rate and market return fluctuation have opposite pattern, but starting 2014 inflation rate and market return have the same decreasing pattern. The banks' stock return and market return seems to have the same pattern. Since the inflation rate also has the opposite pattern with the banks' stock return, it seems that inflation rate reduce the banks' stock return.
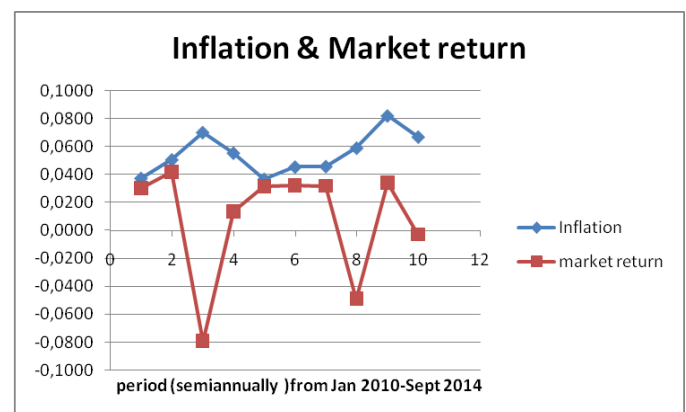
The exchange rate during the period of January 2010 until December 2011 had a decreasing pattern, after that period until 2013 the exchange rate keep increasing, in the first semester of 2014 the exchange rate decreasing. This means that in general the US dollar is more expensive in term of

Rupiah during the period of observation. An increasing value of US dollar in term of Rupiah means that the US dollar is one of good investment alternative for investor besides invest in stock. But investment in the stock and foreign exchange is not a choice of "either or" investment. Those two types of investment can go together in a portfolio.

exchange rate Rupiah/US dollar

period (semiannually) jan 2010-Sept 2014
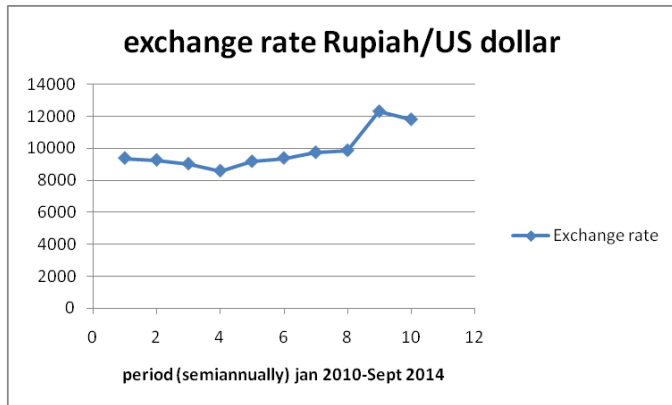
Test of Classical Assumptions

When analyzing multiple regression, we need to run several test in order to make sure that our data are meet with the classical assumption. The good predictors variables are those variables when there are not existence of (i) multicollinearity, (ii) heteroscedasticity and (iii) auto correlation. The procedures are as follows:

1) Test of multicollinearity

Multicollinearity is a statistical phenomenon in which two or more independent variables in a multiple regression model are highly correlated (SUMBER TEXT BOOK). The standard of existence of multicollinearity can be detected by the following indicators:

   i) A multicollinearity exist when the coefficient of correlation of the independent variables > 0.6. Based on Pearson Correlation our data shows that correlation between X_1 to $X_2 = 0.502$, X_1 to $X_3 = 0.013$ and X_2 to $X_3 = -0.146$. All of the independent variables have correlation < 0.6.

   ii) A multicollinearity exist when the value of Variance Inflation Factor $> 1/\alpha$. We set $\alpha = 5\%$, so $1/\alpha = 20$. We found VIF for $X_1 = 1.351$. VIF for $X_2 = 1.380$ and VIF for $X_3 = 1.032$. All VIF values for the independent variables are less than 20.

2) Test of heteroscedasticity In a multiple regression, the variance of residual among variables of data observed should be checked whether there is a specific pattern. Heteroscedasticity exists when the scatter diagram has a regular pattern such as become: narrowed, widened or wavy. Our scatter diagram as shown below is dispersed, this means there is no existence of heteroscedasticity.

3) Test of autocorrelation.

One of the assumptions of the basic regression model is the independence of the residual. When data are collected over sequential periods of time, a residual at any point in time may tend to be similar to residuals at adjacent point in time. Thus positive residuals would be likelier to be followed by positive residuals, and negative residuals would be likelier to be followed by negative residuals. Such a pattern in residual is called autocorrelation. [1]

There is no existence of autocorrelation when Durbin Watson (DW) score lies between $-2 \leq DW \leq 2$. Our DW score is 2.67, so it indicates that there is an autocorrelation. However the existence of autocorrelation in our study does not disturb our prediction because we are purposely measure of bank perseros' stock and market return whereas each return measurement include the time lag that is the incremental value of period t and $t - 1$

4) Test of normality

This test is to identify normality of distribution in variable X and Y that use in the regression equation. Using normal probability plots, a data is said to have normal distribution when the real data follow diagonal line in the diagram. It turned that our data meet the criteria; this means that our data has a normal distribution.

Normal P-P Plot of Regression Standardized Residual

Dependent Variable: STOCK RETURN
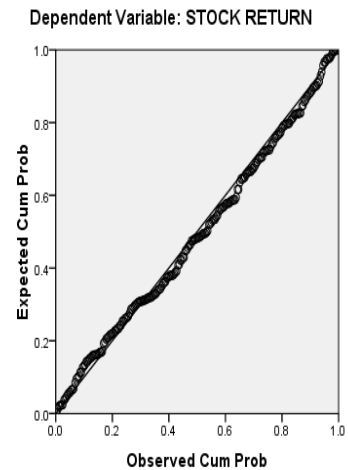
Regression Result

The regression function of this study is as follows:

$$Y = -0.036 + 0.0000033\, X_1 + 0.046\, X_2 + 1.531\, X_3.$$

The regression result showed that all independent variables foreign exchange of Rupiah against US dollar, inflation rate

and market return have positive relation with Bank Perseros' stock return.

From the above regression equation:

$a = -0.036$ means that assumed that the foreign exchange rate of Rupiah against US dollar (X_1), inflation rate (X_2) and market return (X_3) are constant, then Bank Perseros's stock return is negative 0.036

$b_1 = 0.0000033$ means that, for inflation rate (X_2) and market return (X_3) are assumed constant, every Rupiah increase in foreign exchange of Rupiah against The US dollar causes 0.0000033 increase in Bank Perseros' stock return, and vice versa.

The Coefficient of Multiple Determination and Correlation

The coefficient of correlation of the regression model 0.729 this means that all independent variable simultaneously have positive and high correlation to stock return.

The coefficient of multiple determination represent the proportion of variation in stock return that explained by the foreign exchange rate of Rupiah against US dollar (X_1), inflation rate (X_2) and market return (X_3). Our study showed that this $r^2_{y.123} = 0.531$. This means that from the sample, 53.1% of the variation in the bank perseros' stock return can be explained by the variation in the foreign exchange rate of Rupiah against US dollar, inflation rate and market return.

The Test Hypothesis of Partial Regression

The partial correlation between X_i and Y in this study is as follows:

Ho: $\beta_{1-2,3} = 0$ (there is no significant partial regression coefficient of X_1 to Y)

Ha: $\beta_{1-2,3} \neq 0$ (there is significant partial regression coefficient of X_1 to Y)

Result of the study showed that sig = 0.468 > 5% this means that Ho is accepted therefore partially there is no significant effect of foreign exchange rate of Rupiah against US dollars to stock return.

Ho: $\beta_{2-1,3} = 0$ (there is no significant partial regression coefficient of X_2 to Y)

Ha: $\beta_{2-1,3} \neq 0$ (there is significant partial regression coefficient of X_2 to Y)

Result of the study showed that sig = 0.89 > 5% this means that Ho is accepted therefore partially there is no significant effect of inflation rate to stock return.

Ho: $\beta_{3-1,2} = 0$ (there is no significant partial regression coefficient of X_3 to Y)

Ha: $\beta_{3-1,2} \neq 0$ (there is significant partial regression coefficient of X_3 to Y)

Result of the study showed that sig = 0.000 < 5% this means that Ho is rejected therefore partially there is significant effect of market return to stock return.

The Test Hypothesis of The Regression Model

Ho: $\beta_{1,2,3} = 0$.

(foreign exchange rate (X_1), inflation rate (X_2) and market return (X_3) simultaneously do not have significant effect on return of bank perseros' stock (Y).

Ha: $\beta_{1,2,3} \neq 0$.

(foreign exchange rate (X_1), inflation rate (X_2) and market return (X_3) simultaneously have significant effect on return of bank perseros' stock (Y)).

The test of hypothesis in this study shows that simultaneously the foreign exchange rate (X_1), inflation rate (X_2) and market return (X_3) have significant effect on return of bank perseros' stock (Y). This is shown by sig. F = 0.000 < 5% (α). Reject Ho and Accept Ha.

The Coefficient of Partial Correlation and Determination

The coefficient of partial determination measure the proportion of the variation in bank perseros' stock return that is explained by each explanatory variables while holding constant the other explanatory variables.

Model	Partial Correlation	Partial Determination
Forex	.049	0.002401
Inflation	.009	0.000081
Market Return	.723	0.522729

The table above showed that market return has highest correlation to stock return compare to the other two variables.

Market return has the highest effect in explaining the fluctuation of bank perseros' stock relative to the other two independent variables. The market return explain 52.27% of bank perseros' return fluctuation while holding foreign exchange rate of Rupiah against US dollar and inflation rate constant

Conclusion

In Indonesia stock market, for bank perseros' stock during the 2010-2014, seems to be very much influenced by financial market condition rather than Indonesia economic condition.

From 2010 until 2014 both macroeconomics and financial markets simultaneously have effect on return of bank perseros' stock. However the financial market variable has much greater effect compare to the other variables.

Nominal interest rate increase when inflation rate increase, this means that both rate of saving interest and credit interest are increase. Increase in nominal interest rate does not automatically increase bank interest income. This is due to that during high interest rate it is often difficult for bank to give credit to business sector. This explains why inflation rate as independent variable has no significant effect on stock return of bank perseros.

From point of view of the bank, Although during period of observation value of US dollar in term of Rupiah increasing but because not every bank has take business in foreign exchange, so the bank's revenue relatively do not have significant effect with foreign exchange rate.

References

[1] G. Berenson, M.L. and Levine, D,M . *Basic Business S*tatistics. *Concepts and Applications,*6ᵗʰ edition, Prentice Hall ,1996.

[2] Eitman, K.E, Stonehill, A.I, and Moffet, MH *Multinational Business Finance*. 13ᵗʰ edition Pearson Global Edition, 2013.

[3] Jogiyanto. *Teori-teori Portofolio dan Analisis Investasi,* Edisi Ketiga, BPFE, Yogyakarta, 2003.

[4] Parkin, M. *Economics.* 10ᵗʰ edition, Pearson International, 2010.

[5] Samuelson, P. and Nordhaus. *Economics.* 17 edition, International edition, Mc Graw Hill Irwin, 2005.

[6] Singh, T., Mehta, S., and Varsha, M.S. "Macroeconomic factors and stock returns: Evidence from Taiwan." *Journal of Economics and International Finance* Vol 2 (4)

[7] Sinta Boentoro dan Dwiki Haryo Putro. ."Analisis Pengaruh Tingkat Suku Bunga SBI, Inflasi, dan ROE terhadap Harga Pasar Saham Perbankan milik Pemerintah". *Jurnal Ekonomi dan Bisnis* Vol 3, Universitas Katolik Indonesia Atmajaya, Jakarta, 2012.

[8] Suyanto. "Pengaruh Nilai Tukar Rupiah, Suku Bunga, dan Inflasi terhadap Harga Saham Telekomunikasi Indonesia Tbk" *Jurnal Pengembangan Wiraswasta* Vol 10, No 2, STIE IPWIJA, Jakarta, 2008.

[9] Tian, G G., and Ma, S. "The relationship between stock returns and the foreign exchange rate: the ARDL approach." *University of Wollongong Research Online, Faculty of Commerce Papers (Archive), Faculty of Business*, 2010.

[10] www.bisnis.news.viva.co.id

[11] www.federalreserve.gov/newsevent/speech/bernake/20081204 arkin, M. *Economics.* 10ᵗʰ edition, Pearson International, 2010.