The Effect of Macroeconomic Variables on Stock Price of Telecommunication Companies Which are Listed on The Indonesia Stock Exchange

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Abstract: *The purpose of the research is to find out and to analyze the influence of macroeconomic variables (inflation, BI rate, Exchange Rate, Growth GDP) to the stock market price of telecommunication companies which are listed in Indonesia Stock Exchange in 2007-2015 periods. The sample collection has been carried out by using purposive sampling method, and the samples are 4 companies telecommunication with the observation period from 2007 to 2015. The secondary data sources in this research have been obtained from the official website of Indonesia Stock Exchange and Bank of Indonesia. The data analysis technique has been done by using VAR/VECM and Eviews program. Based on the result of the analysis, it can be concluded that (1) Inflation and interest rate have significant and negative influence to the stock market price on the Telecommunication's companies which are listed in the Indonesia Stock Exchange. (2) Exchange rate and GDP growth have positive influence to the stock market price of the telecommunication companies which are listed in Indonesia Stock Exchange.*

Keywords: telecommunication, inflation, exchange rate, growth GDP

1. Introduction

In current economic era, companies will certainly need additional capital to drive operational performance so that they can compete with theirs competitor. One of the company's effort to get additional capital is by offering ownership of the company to the public. The capital market is a place for companies to be able to collect business capital by offering their shares to the public.

Capital markets play an important role in the economy of a country, where the value of the stock exchange index in the capital market is a major indicator of a country's economy and finances. Shares are evidence of a person's ownership or shareholders of the company's assets. Stocks are one of the securities among other securities that have a high level of risk. The high risk is due to the uncertainty of return received by investors in the future. The greater the return received, the greater the risk that will be obtained. Returns and high risks to stocks are interrelated with the conditions of macroeconomic, industrial and corporate characteristics.

Macroeconomic factors that can effect stock returns include inflation, interest rates, Gross Domestic product (GDP) growth, IDR/USD exchange rates. Among the various sectors whose shares are offered by the Indonesia Stock Exchange, the telecommunications sector shares are known to be quite attractive to investors. Telecommunication service users that continue to experience an increase have the potential for the telecommunications industry to continue to grow in the future, attracting investors to invest in the telecommunications industry (Herlianto, Didit 2013). This is also supported by the data obtained by the Central Statistics Agency (BPS) in the rate of GDP growth according to the business field in 2014 which showed that the postal and telecommunications subsectors experienced the highest growth in 2014 reaching 10.02%.

Investors need to consider macroeconomic variables when valuing shares. Interest rates, exchange rates, inflation and GDP growth are important macroeconomic variables and affect the performance of the stock market (Khan et al 2014). By knowing the macroeconomic conditions of a country, investors can decide to invest funds in the stock market or not. This is because the condition of the stock market has a close relationship with the economic conditions of a country. Fluctuations that occur in the rupiah exchange rate, inflation, GDP growth and Indonesian interest rates will affect investment. A stronger exchange rate indicates a developing and attractive economy for investment activities. This will have an impact on stock price increases so that stock returns will increase (Sunariyah 2003). Inflation that occurs can reduce the level of profitability of the company, thereby reducing investor interest in the company's shares. Reduced investor interest in these shares can cause a decline in stock prices and stock returns (Gitman 2001). The deteriorating Gross Domestic Product will cause a decline in people's purchasing power in real terms, this means a decrease in the ability of the community to invest their funds in the stock market which results in a decrease in transactions on the stock market. An increase in interest rates will cause investors to sell all or part of their shares so that stock prices will decrease and stock returns will decrease, (Alam 2007; McConnel and Brue 2002).

Based on the above problems, the objectives of this research were as follows:
1) Observing the effect of macroeconomic variables (SBI interest rates, US Dollar exchange rates, inflation, Gross Domestic Product (GDP) growth) on stock prices in the telecommunications industry listed on the Indonesia Stock Exchange (IDX);
2) Analyzing the sensitivity of macroeconomic variables to stock prices in the telecommunications industry listed on the Indonesia Stock Exchange (IDX);
3) Observing which variables are the most dominant influence on stock prices in the telecommunications

industry listed on the Indonesia Stock Exchange (IDX).

2. Data

The data used in this reseach includes annual changes from time series economic data or monthly time series. Changes on an annual basis (year on year / y-o-y) are changes that are calculated from one period to the same period the previous year and are intended to eliminate cyclical or seasonal factors in the data. This type of data consists of secondary data obtained from several sources including data on the exchange rate of the Rupiah against the US Dollar, data on Bank Indonesia Certificates, Inflation data, GDP growth data and monthly closing price data. All data is obtained from data provider institutions / agencies, whether obtained through printed publications or publications through website / data provider sites.

Data samples in this study are listed telecommunication subsector companies from January 2007 to December 2015. The data is published by the IDX through the www.idx.co.id page. Based on data obtained from the IDX, there are 4 listed companies listed in the telecommunications subsector.

Table 1: The type and source of data used in the research

No.	Data Type	Unit	Source Data
1	Closing price of telecommunication subsector shares	Poin	*Yahoo Finance*
2	Exchange Rate	IDR/USD	Bank Indonesia (BI)
3	BI *Rate*	%	Bank Indonesia (BI)
4	Inflation	%	Bank Indonesia (BI)
5	GDP Growth	%	Badan Pusat Statistik

Table 2: Telecommunication subsector issuers were used as research samples

No	Stock Code	Emiten Name	IPO Date
1	EXCL	PT. XL Axiata Tbk	29-Sep-2005
2	FREN	PT. Smartfren Telecom Tbk	29-Nov-2006
3	ISAT	PT. Indosat Tbk	19-Oct-1994
4	TLKM	PT. Telekomunikasi Indonesia Tbk	14-Nov-1995

Source: www.sahamok.com

3. Methodology

This research is divided into several stages of implementation which can be explained as follows:
1) Collect data needed and standardize data.
   a) Required monthly macroeconomic data (GDP, inflation, BI rate, IDR / USD exchange rate).
   b) Monthly share price data.
2) Test assumptions on data stationarity, co-integration tests, or long-term relationships between variables.
3) Choosing the best analytical tool to get a model of the relationship between macroeconomic variables and stock prices.
4) Doing processing data collected with the analytical method that has been determined using E-views 9.0 software.
5) Perform validation and interpretation of the model obtained from the results of processing.

6) Conduct a sensitivity analysis of the model that has been validated and provide conclusions on the results.

The data analysis technique used in this study is to use times series analysis with dynamic regression. Vector Auto Regression (VAR) or Vector Correction Model (VECM) models are one analysis method that can be used for times series data. The VAR / VECM model is built with an approach that minimizes theory with the aim of being able to capture economic phenomena well. The VAR / VECM model is referred to as a non-structural or non-theoretical model. VAR / VECM analysis is an analytical tool that is very useful in understanding the interrelationship between economic variables and in the formation of a structured economic model (Juanda B, Junaidi 2012).

There are several important analyzes in the VAR / VECM model, including (1) forecast, (2) impulse respone, (3) forecast error decomposition variance, and (4) Ganger Causality Test. In this study the author directs to use the concept of VAR / VECM for forecasting, sensitivity analysis through impulse respone and seeing the dominant variables through variance decomposition.

4. Results

Unit Root Test Result
The main requirement for time series data analysis is the assumption that each data used is stationary. The variables used in this study are data on several macroeconomic variables and stock price levels of the telecommunications industry listed on the IDX which is time series data. Formal testing to see if the data is stationary is to use ADF-test, with a confidence level of 95%. One assumption that data is stationary is the absence of a trend. If the data is not stationary at the level, the differencing process must be done to be tested again whether the data is stationary. The initial hypothesis for this test is:
H0: $\delta = 0$, (data is not stationary or contains unit root)
H1: $\delta < 0$, (stationary data)

If the p-value value of the ADF-test test results is less than 5%, then H0 is rejected which means that the data is stationary. Based on the ADF test, it was found that the data used in this analysis were stationary for first level differencing.

Table 4: Unit Root Test Result at Level

Variabel	Nilai ADF	Nilai Kritis Mc Kinnon			Prob.*	Keterangan
		1% level	5% level	10% level		
TLKM	-0.904	-3.493	-2.889	-2.581	0.784	Tidak Stasioner
ISAT	-2.462	-3.493	-2.889	-2.581	0.128	Tidak Stasioner
EXCL	-1.332	-3.493	-2.889	-2.581	0.613	Tidak Stasioner
FREN	-1.556	-3.494	-2.889	-2.582	0.501	Tidak Stasioner
INF	-2.526	-3.494	-2.889	-2.581	0.112	Tidak Stasioner
BIRATE	-2.182	-3.493	-2.889	-2.582	0.214	Tidak Stasioner
KURS	-0.397	-3.494	-2.889	-2.582	0.905	Tidak Stasioner
GDP	-1.917	-3.500	-2.892	-2.583	0.323	Tidak Stasioner

TLKM, ISAT, EXCL, FREN, INF, BIRATE, KURS, and GDP are not stationary at the level because the 8th ADF absolute value of these variables is smaller than the absolute

value of Mc Kinnon. Because the data for the eight variables are not stationary, it is necessary to proceed to the unit root test at first difference.

Table 5: Unit Root Test Result at First Difference

Variabel	Nilai ADF	Nilai Kritis Mc Kinnon			Prob.*	Keterangan
		1% level	5% level	10% level		
TLKM	-9.541	-3.494	-2.889	-2.582	0.000	Stasioner
ISAT	-9.684	-3.494	-2.889	-2.582	0.000	Stasioner
EXCL	-8.919	-3.494	-2.889	-2.582	0.000	Stasioner
FREN	-15.468	-3.494	-2.889	-2.582	0.000	Stasioner
INF	-10.588	-3.494	-2.889	-2.581	0.000	Stasioner
BIRATE	-4.573	-3.494	-2.889	-2.582	0.000	Stasioner
KURS	-7.680	-3.494	-2.889	-2.582	0.000	Stasioner
GDP	-2.472	-2.590	-1.944	-1.614	0.014	Stasioner

Data stationary test results at first difference show that the eight variables used in the study have been stationary at the first difference level. This is because the absolute value of the ADF is greater than the absolute value of the MacKinnon Critical Values.

Optimum Lag Selection and VAR Stability
Selecting the optimum lag on the model uses the minimum lag recommendation value based on the 5 tests contained in the E-views 9.0 application. There are 5 tests contained in the E-views application to get Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Information Criterion (SC) and Hannan-Quinn Information Criterion (HQ). Optimal lag selection is used to ensure that the lag value that can be used at the VAR / VECM level is in accordance with the established criteria.

Before the process of determining the optimum lag amount, it is necessary to find the maximum lag which is the largest lag value that can be used in a stable VAR / VECM system. Stability testing for VAR / VECM models is generated by using the AR Root Test process in the E-views 9.0 program. The maximum lag and optimum lag of each variable are presented in Table 6. Based on the results of the optimum lag test, the number of lags that will be used in the VAR / VECM model for all variables used is lag 1.

Table 6: Hasil Uji Lag Optimum

Lag	LogL	LR	FPE	AIC	SC	HQ
0	124.7739	NA	2.13e-09	-2.73760	- 2.94995	2.823470
1	646.1227	1398.740	1.00e-15	-11.83758	9.926456*	-11.06482
2	727.7964	134.7195	7.14e-16	-12.20199	-8.592084	-10.74232
3	802.7409	111.2577	6.08e-16	-12.42765	-7.118965	-10.28108
4	891.6201	117.2839	4.15e-16	-12.94062	-5.933160	-10.10715
5	994.8412	119.1831	2.32e-16	-13.74930	-5.043063	-10.22893
6	1138.925	142.5981	6.41e-17	-15.40051	-4.995490	-11.19323
7	1228.110	73.55509	6.71e-17	-15.91980	-3.816001	-11.02562
8	1313.016	56.02015	1.04e-16	-16.35084	-2.548265	-10.76975
9	1458.347	71.91665	7.64e-17	-18.02778	-2.526426	-11.75979
10	1741.723	93.48461*	8.21e-18*	-22.5509*	-5.350849	-15.5960*
Note: * (lag optimal)						

The optimal lag test results from SC shows the optimal number of lags that is 1, the optimal lag of LR, FPE, AIC, and HQ shows the optimal number of lags that is 10. So the determination of the optimal lag is selected the smallest one is 1.

Model Stability Testing (VAR Stability Test)
VAR stability test is done through VAR stability condition check in the form of roots of characteristic polynomial for all variables used multiplied by the number of lags of each VAR. If the modulus of all roots of characteristic polynomial <1 then the VAR equation system is categorized as stable, then the IRF and FEDV generated are considered accurate.

The results of the stability test show that the modulus generated in the VAR equation system for the telecommunication stock price level model with macroeconomic variables has values ranging from 0.30-0.99. VAR stability test with a modulus value <1 indicates that the system value of the VAR equation in the model used has been stable.

Co-integration Test Result
Co-integration tests are carried out to determine the long-term relationship of the variables used, although these variables are not stationary when viewed individually. However, a linear combination between two or more time series data can be stationary.

Based on stationary data testing, it is found that all data is stationary at the first level data difference. For this reason, it is necessary to conduct co-integration tests to see whether there are long-term relationships between variables that can affect the model. The co-integration test was conducted using the Johansen Co-integration Test based on trace statistics with a 95% confidence level. If there is no co-integration or long-term relationship between variables, the VAR method will be used with the 1st difference data whereas if there is a co-integration of the variables, the VECM method will be used.

Table 7: Co-integration Test Result

Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.429128	189.9515	169.5991	0.0027
At most 1	0.347282	131.0895	134.6780	0.0798
At most 2	0.285757	86.29543	103.8473	0.4010
At most 3	0.190252	50.95960	76.97277	0.8258
At most 4	0.087202	28.80126	54.07904	0.9380
At most 5	0.078087	19.22096	35.19275	0.7740

At most 6	0.056160	10.68398	20.26184	0.5727
At most 7	0.043001	4.615109	9.164546	0.3283

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.429128	58.86204	53.18784	0.0119
At most 1	0.347282	44.79406	47.07897	0.0861
At most 2	0.285757	35.33583	40.95680	0.1871
At most 3	0.190252	22.15834	34.80587	0.6625
At most 4	0.087202	9.580303	28.58808	0.9959
At most 5	0.078087	8.536983	22.29962	0.9291
At most 6	0.056160	6.068867	15.89210	0.7802
At most 7	0.043001	4.615109	9.164546	0.3283

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

If the Trace statistical value and Max-Eigenvalue are greater than the critical value, then at that level we can accept the H1 hypothesis which states the number of co-integration ranks. The co-integration test results from the trace test statistics and the Max-Eigenvalue test show that there is 1 equation which is co-integrated and significant at α = 5%. This can be seen from the Prob. value. <0.05 means there is co-integration between variables.

Impact of Macroeconomic Variable Shocks on Stock Price Levels

Impulse Response Function (IRF) analysis will explain the impact of shock on one variable on another variable, where in this analysis not only in a short time but can analyze for several horizons in the future as long-term information. Shock from a variable not only affects the variable but can be transmitted to all variables through lag. Impulse Response Function analysis can explain the effect of a variable shock on other variables both in the short and long term.

Summary of results of sensitivity analysis

Forecast Error Variance Decomposition (FEVD)

Fluctuations in each variable due to a shock can be done by analyzing the role of each shock in explaining the fluctuations of macroeconomic variables through FEVD analysis or also called variance decomposition analysis, where in this analysis the contribution of variable shocks in the system to changes in certain variables can is known.

Summary of the results of the contribution of macroeconomic variables to telecommunications stock prices

Managerial Implications

The telecommunications industry is an industry that greatly influences the economic development of other industries in various sectors. The telecommunications industry is a support for other industries in terms of means of communication. Based on the results of an analysis of macroeconomic variables (inflation, interest rates, IDR / USD exchange rates, GDP growth) that affect the stock prices of the telecommunications industry during the period 2007-2015, some policy implications can be formulated for those interested in investing in the capital market, especially the telecommunications industry. Based on this research, the condition of the development of inflation is one of the factors that must be considered by investors in investing their money in the telecommunications stock market, the impact of the shock variable inflation when experiencing a decline will be negatively responded by the prices of telecommunication shares that will reduce investment returns. When the inflation rate continues to rise, investors should need to release their shareholdings so as to reduce losses. This applies to all telecommunications stocks (Telkom, Indosat, XL, Bakrie, Smartfren).

The GDP growth variable provides a significant contribution to the increase or decrease in prices of telecommunications stocks so that investors are deemed necessary to view this variable as a reference in determining their investment. In addition, other macroeconomic variables that have a significant effect on telecommunications stock prices are interest rates. The increase in interest rates will have an impact on the decline in the price of telecommunications shares so that investors need to pay attention to the interest rate factor as a reference in making investments.

5. Conclusion

Based on several discussions and analyzes described above, it can be concluded that there is a relationship between macroeconomic variables (inflation, IDR / USD exchange rates, interest rates, GDP growth) on the stock prices of the telecommunications industry listed on the IDX. Changes in

macroeconomic variables to the price of telecommunications stocks have different effects depending on the conditions faced by the company. The inflation factor has a significant influence compared to others on the stock price of the telecommunications industry.

Sensitivity due to macroeconomic changes to the stock price of the telecommunications industry is different from one another. The resulting VECM model shows that inflation has a negative relationship to stock prices so that any increase in the inflation rate will be responded to by the decline in the share price of the telecommunications industry. The same thing happens at the interest rate, although not at the inflation rate, the interest rate factor has a role in influencing stock prices. The exchange rate factor and GDP growth have a positive relationship to stock prices so that when the exchange rate and GDP growth increase then the response of stock prices will increase as well.

The FEVD results show that the changes in the share price of telecommunications companies are more determined by their own variables both in the short and long term, this means that there are other factors that influence changes in stock prices in addition to the above macro-economic variables. However, the GDP growth variable and interest rates contribute significantly to changes in telecommunications company stock prices compared to exchange rates and inflation.

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