

Relationship between Stock Price and Exchange Rate in Indonesia (Empirical Study at Macro and Micro Level)

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Abstract: *The relationship between the exchange rate and the stock price has been widely studied. This is due to the variety of existing research results on the relationship between the two variables. In addition, high volatility both from exchange rates and stock prices often give unexpected influence to each other. The purpose of this study is to get an idea about relationship and direction of the influence of the exchange rate and stock price in two levels. At macro level when exchange rate associated with Indonesia Composite Stock Price Index (JCI) and at micro level when series of test applied between exchange rate and companies stock price (sample from agricultural industry). The data that had been transformed into natural logarithm then undergoing a series of tests such as unit root test, cointegration test, VAR / VECM test, and Granger causality test. The results show that there is a two-way relationship between JCI and exchange rate and there are mixed result about relationship of exchange rate and stocks price at the micro level.*

Keywords: stock prices, exchange rate, agriculture, causality.

1. Introduction

Indonesia issued Law no. 8 of 1995 concerning the capital market as an effort to deregulate the capital market, with the goals to increase the role of capital market as one of financing source for business world and public investment vehicle and to anticipate economic globalization. The issue of this law has given foreign investors permission to own 100% of stocks. This move has led to the liberalization and integration of capital markets, it can be seen from the increasing number of foreign capital inflows into Indonesia through the capital market. Total buying from foreign investors in the stock market throughout 2016 233% more than in 2007.

The significant impact of the flow of investment in the stock market to the growth of the market, also impacted by the higher volatility in the stock market, which was offset by the volatility of the exchange rate as a result of supply and demand of foreign securities transactions. In this situation, a sell-off action by foreign investors in the capital market will have an impact on the depreciation of the exchange rate, due to the high demand for foreign currency. This situation is similar to the situation that occurred during the Asian financial crisis in 1997, where the sudden withdrawal of foreign funds has led to the significant slump of the Indonesian capital market and the weakening of the Rupiah against foreign currencies.

The relationship between exchange rates and stock prices has attracted much attention from both the economic and financial sectors. At the macro level, Ma and Kao found that the appreciation of the exchange rate have negative effects for countries with dominant export activities, otherwise giving a positive effect on the country with dominant import activities [1]. Ajayi and Mougoue find there is a significant interaction between the daily exchange rate and return on stocks return [2]. Research conducted by Astuti, Apriani and

Susanta has proven that during the period 2008-2012 exchange rate showed a very strong correlation with JCI, and has contributed 57.9% influence to JCI movement [3].

On the micro level, the relationship between the exchange rate and stock prices often associated with risk exposure of the exchange rate on stock prices. A number of studies have shown mixed results regarding the relationship between exchange rates and firm stock prices. Bartram by using a sample of companies in the American market with daily data inputs found that only 13.2% of the sample studied were significantly exposed to foreign exchange rate risk [4]. Similar results were found by Aggarwal and Harper using monthly, quarterly, and annual data [5]. Even from firms that are significant to exchange rate exposure, there are large grouping differences, some are significantly positive and others are negative. In Indonesia research conducted by Utami and Rahayu by using multiple regression analysis found that the rupiah exchange rate against the dollar partially have an influence on the company's stock price during the period of the economic crisis Asia in 1998-2000 [6].

The relationship between exchange rates and stock prices can be explained through two approaches: Traditional Approach and Portfolio Approach. Traditional Approach using flow-oriented models to examine the relationship of the exchange rate and stock prices, this model suggests that the current account and the performance of the trade balance of a country is an important determinant of the exchange rate. Thus, changes in exchange rates will affect international competition which then affects variables such as transactions, future payments, receipts, and so on. Changes to these variables give effect to the value of the company which will further affect the stock price.

Portfolio Approach use traditional stock-oriented model. This model states that the capital account is a factor affecting

the exchange rate. Foreign capital inflows that enter through the stock market will strengthen the domestic currency due to high demand for the currency. That means, in Portofolio Approach there is a causal relationship that moves from stock price to exchange rate. Even so, Muntasir found at micro level there is a weak relationship between exchange rate and stock price in the form of this approach [7].

This study aims to identify and analyze the relationship between the exchange rate (Rupiah/ US Dollar) and the JCI also relationship between exchange rate and company stock price (represented by agricultural company listed in IDX).

2. Data and Methodology

This study has used secondary data that has been obtained from various sources. In order to get a robust result, this study used daily closing price of the stock index, stock prices of agricultural sector, and the rupiah against the US Dollar. Sample period from 1 January 2007 until December 30, 2016. Only company that had been listed from 1st January 2007 to 30th December 2016 selected to be research sample Therefore, only 9 out of 21 agricultural companies used in this research.

Table 1: Companies sample from agricultural sector industry

No	Code	Market Capitalization (Million Rupiah)	Foreign Investor (%)	Public Shares (%)
1	AALI	32,286,646	58.36	20.32
2	BTEK	7,115,165	92.08	26.53
3	CPRO	2,023,536	54.86	43.22
4	DSFI	293,427	43.22	25.96
5	IJKP	8,433,600	92.29	86.84
6	LSIP	11,871,783	72.42	40.52
7	SMAR	12,494,041	11.61	2.80
8	TBLA	5,288,677	70.56	48.75
9	UNSP	686,023	83.79	-

The method used in this study is Granger causality test in a VAR/VECM environment. Vector autoregression (VAR) is a non-structural approaches are used to analyze the time series data. VAR appears as an alternative analysis of time coherent data that does not meet the requirements required in structural analysis. The VAR approach avoids the need for structural modeling by treating each endogenous variable as a function of the residual value of all endogenous variables in the system. Mathematically VAR can be formulated as follows:

$$y_t = A_1 y_{t-1} + \dots + A_p y_{t-p} + Bx_t + \varepsilon_t \quad (1)$$

Vector error correction model (VECM) is a VAR that is designed for use on a time series of data which is not stationary. VECM included cointegration relation to the specifications by limiting long-term behavior of endogenous variables to blend into the cointegration relationship yet still make adjustments to short-term dynamics. VECM is known as a method of error correction because long-run equilibrium deviations are gradually corrected through a series of partial

3. Result

3.1 Relationship between JCI and KURS

Unit root test of JCI and KURS variables shows that both the KURS and JCI data are not stationary at level but stationary at first differen. The result of cointegration test shows that there is one trace of cointegration between JCI and KURS, the trace found by using quadratic model without intercept and without trend, in order to avoid bias, VECM used to the test the relationship between JCI and KURS. Based on the Granger causality test, there is a two-way relationship between JCI and KURS.

Table 2: Result of Granger causality test IHSG dan KURS

Information	Chi-sq	df	Prob.
KURS - JCI	11.76742	2	0.0028
JCI - KURS	29.25635	2	0.0000

KURS significantly affect the JCI, with a probability value of 0.0028 the null hypothesis that states that there is no causal relationship from KURS to JCI is rejected. Similarly, IHSG JCI also significantly affects KURS with a probability value of 0.0000.

The dynamic behavior between variables in the VAR and VECM models can be seen through the response of each variable to the shock of the variable and to other endogenous variables. For this purpose an estimated variance of decomposition and impulse response (IRF) is required.

The result of IRF shows that the response given by IHSG to KURS shock only happened on the second periode. While KURS give response to JCI shock in the first period. That means, changes that occur on the JCI will be responded by KURS immediately. The response of each variable to another variable is positive and lasts in the long run.

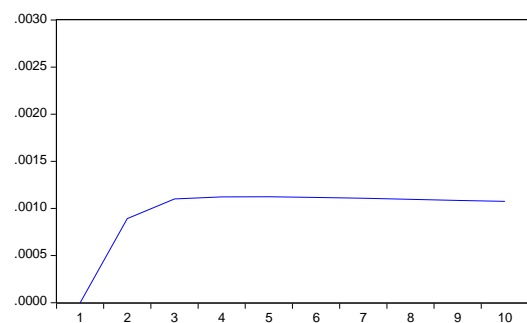


Figure 1: Response JCI to KURS

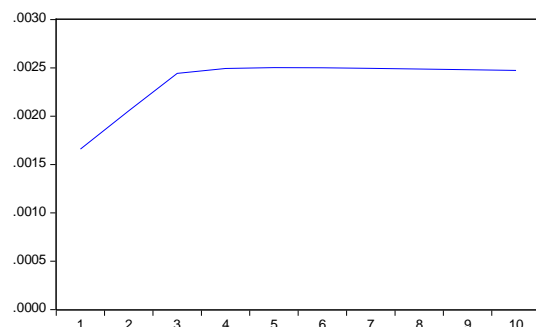


Figure 2: Response KURS to JCI

The estimation result of variance decomposition shows that the average amount of innovation contributed by JCI to the innovation experienced by KURS in the span of ten periods is 19.28%. That means considering only these two variables, in case of rupiah depreciation of 500, the decrease of 96.4 is contributed by JCI, and the rest is due to the effect of the KURS variable on itself.

The result of variance decomposition for every change that happened to KURS, indicating that JCI donated the amount of change equal to 0,32%. This magnitude is very small when compared to the amount of JCI contribution for each change of KURS. Thus, although JCI and KURS are mutually influential but the contribution of JCI influence to KURS is greater.

3.2 Agricultural Stocks and KURS

The relations of agricultural stocks and KURS are descriptively seen simultaneously. When the weakening of KURS, the index of agricultural stock price also weakened. However, looking at the trends of each variable, the KURS has a sharper downward trend.

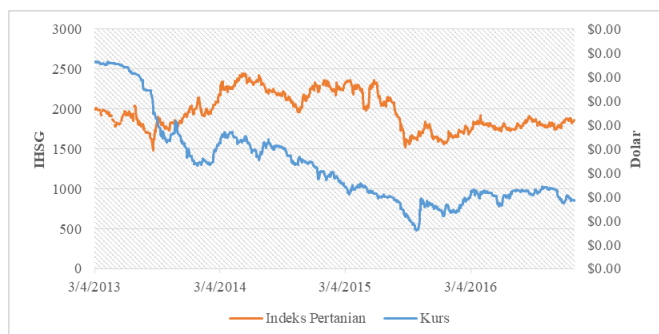


Figure 3: Movement of JCI and KURS

The stocks of the agricultural industry examined in this study are based on unit root test not stationary at the level but stationer on the first difference. The study was conducted with VAR on the first differentiator, since no cointegration was found between each variable with KURS.

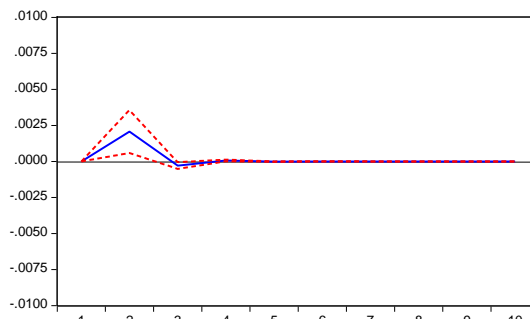
Through the Granger causality test known that from the nine companies tested there are three companies that show the relationship with KURS. The three companies are CPRO, SMAR, and TBLA.

Table 3: Causality test result in agricultural industry

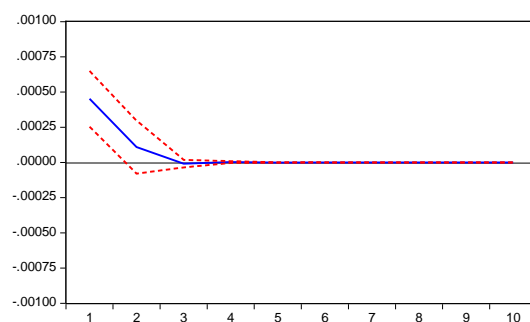
No	Variable	Chi-sq	Df	Prob.
1	KURS - SMAR	7.291741	1	0.0069
	SMAR - KURS	0.790428	1	0.3740
2	KURS - TBLA	13.57089	2	0.0011
	TBLA - KURS	5.844402	2	0.0538
3	KURS - CPRO	3.935552	4	0.4148
	CPRO - KURS	25.07934	4	0.0000

SMAR on lag 1 is significantly influenced by KURS, null hypothesis is rejected because the probability value is not greater than expected value. In the same lag, KURS is not affected by SMAR (0.3740). That means, the change in value on KURS could trigger the SMAR price movement.

The result of variance decomposition estimation shows that SMAR in period 1 is affected by 0.9% by shock experienced by KURS. The average influence in ten periods was also 0.9%. The result of impulse response shows that the effect experienced by SMAR is positive. That means if the rupiah depreciated, then the next day SMAR shares have the possibility to be correction.



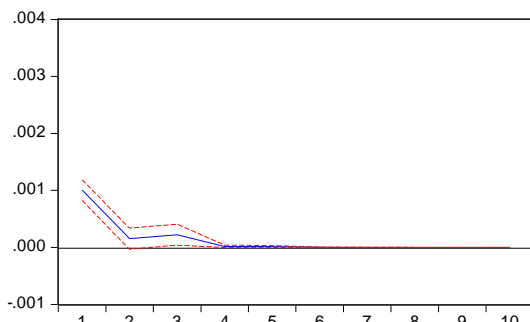
Graph 4: Response SMAR to KURS



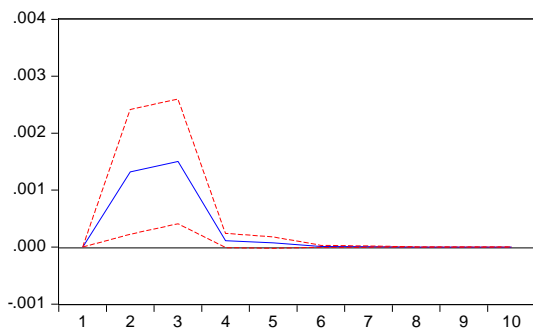
Graph 5: Response KURS to SMAR

The Granger causality test of the TBLA and KURS share relationships is performed in lags 1 to 2, this refers to the optimal lag test results. The test results show that KURS significantly influence TBLA (0.0011), while the influence of TBLA does not significantly affect KURS.

The result of variance decomposition estimation shows that TBLA in period 2 innovates 4.6% to the innovation experienced by KURS. Although in period 2 of KURS also showed reaction to change of TBLA, but change of KURS only happened 0,2%. The result of impulse response shows that the effect experienced by SMAR is positive. That means if the Rupiah depreciated, then the next day SMAR shares will go down.

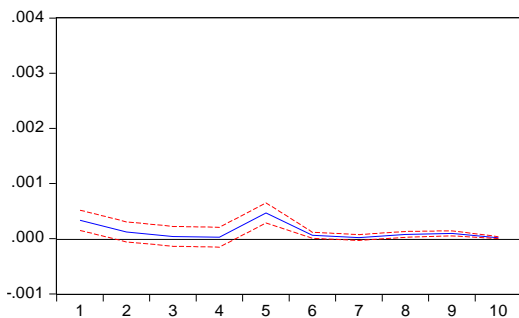


Graph 6: Response KURS to TBLA

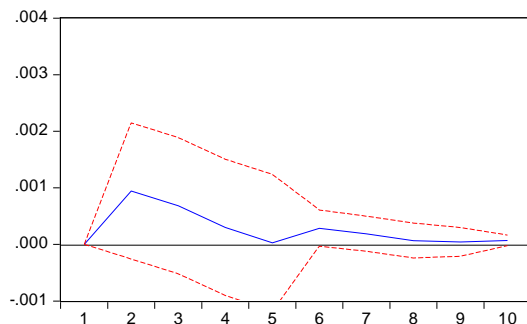


Graph 7: Response TBLA to KURS

Granger causality test on CPRO and KURS share relationships is done with optimal lag value 4. Test results show that CPRO significantly affects KURS (0.0000), while CPRO does not give effect to KURS.



Graph 8: Response KURS to CPRO



Graph 9: Response CPRO to KURS

The result of variance decomposition estimation shows that CPRO innovates 0.14% on KURS innovation in the 4th period. While in the same period, KURS innovates 1.5% towards CPRO change. The result of impulse response shows that the effect experienced by KURS is positive. This means that if the CPRO stock is weakened, then the Rupiah has the potential to depreciate.

Although CPRO has the potential to affect KURS, the amount of innovation that contributed to KURS changes is very small. Average value of innovations that occurred in CPRO is only 0.9%.

4. Managerial Implication

The two-way relationship between JCI and KURS is not supported by the interaction of stock issuers with the exchange rate, especially agricultural stocks. Among the nine stocks of the agricultural sector sampled were only three shares showing interaction with KURS. The interaction of

KURS from each company is different, both at the level of significance and from the direction of its influence. That means, the interaction that occurs between JCI and KURS can not be fully used as a role model in making the issuer's stock policy in relation to the exchange rate.

When viewed in terms of market capitalization, the percentage of foreign shares, and the percentage of public shares, no stocks with small market capitalization amounts (less than 1 trillion rupiahs) affect and are affected by KURS. Two out of four stocks in the medium-market capitalization category (worth between 1 trillion-10 trillion) have a relationship with KURS. These two companies are CPRO and TBLA, both of which have the same percentage of medium public stock (25% -65%), but the difference is the percentage of foreign investors. CPRO has a foreign investor percentage of 54.86% (medium), while the percentage of foreign investors TBLA is 70.56% (large). Shares with large market capitalization values and a small percentage of foreign investors are likely to be affected by KURS.

The effect given or received by the shares of the agricultural sector is positive, it means if there is appreciation of the value of Rupiah then the value of shares of SMAR and TBLA has the potential to increase, and vice versa. Although based on the result of variance decomposition the contribution of the magnitude of the effect given by KURS is very small to the stocks, but the company still need to be wary of KURS movement to avoid greater risk.

5. Conclusion

Based on the research that has been done, it can be concluded that there is a two-way relationship between IHSG and KURS. Based on the estimation result of variance decomposition, the contribution of IHSG influence to KURS is greater than the effect of KURS on JCI. KURS will immediately react on the first day due to the shock received by JCI, while the new JCI showed a reaction to the shock experienced by KURS on the second day.

Test results on agricultural stocks showed that 33% of the total sample has a relationship with KURS. The relationship between stock issuers and KURS varies, 22% of companies show there is a causal relationship running from KURS to issuer shares, and 11% of companies show the running causality of the issuer's shares to KURS.

Based on descriptive analysis there is a possibility that the difference in direction of influence is influenced by market capitalization, percentage of foreign shares, and percentage of public shares owned by the company. Agricultural companies with a capitalization of shares below 1 trillion Rupiah have little possibility to influence and be affected by KURS. The results of this study also support the results of previous research by Muntasir stating that there is a deeper relationship in the form of approach portfolio approach of stock issuers to exchange rates.

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