



Analysis Relative Strength Index and Earning Per Share on Stock Price

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Authors' contribution

The sole author designed, analysed, interpreted and prepared the manuscript.

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ABSTRACT

This study aims to determine the effect of the Relative Strength Index and Earning Per Share on Stock Prices. The research design used is a quantitative approach with a population of all companies in the *Jakarta Islamic Index (JII)* category listed on the Indonesia Stock Exchange for the 2013-2016 periods. The sampling technique used was purposive sampling. Based on the criteria set, 13 companies were obtained. The results showed that the Relative Strength Index and Earning Per Share had a significant positive effect on Stock Prices in the *Jakarta Islamic Index (JII)* company on the Indonesia Stock Exchange for the Period 2013-2016.

Keywords: *Relative Strength Index (RSI); Earning per Share (EPS); stock price Jakarta Islamic Index (JII).*

1. INTRODUCTION

Stock are letters of ownership of investor ownership in a company, the amount of ownership is determined by how much the funds invested by investors in the company.

Furthermore, the investors in the process of making investments are inseparable from information, both quantitative and qualitative information. Therefore, the role of information in making investment decisions in the capital market is very important.

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Investors in making investment decisions depend on the information received. The information received is analyzed through a fundamental analysis and technical analysis approach. Fundamental Analysis is an analysis that uses financial statement data, as well as economic events that influence it. Investors are very interested in current earnings information and future earnings potential and profit stability. So that it can be predicted to what extent the potential of the company can return its investment. Furthermore, technical analysis is an analysis of testing past and present stock price data to predict stock prices in the future. The method used in conducting technical analysis is usually Moving Average (MA), Bollinger Band (BB), Relative Strength Index (RSI), Stochastic, and Moving Average Convergence Divergence (MACD).

Based on these explanations researchers are interested in conducting research on the Analysis of the Relative Strength Index (RSI) and Earning Per Share (EPS) on stock prices for the period 2013-2016 in *Jakarta Islamic Index (JII)* companies on the Indonesia Stock Exchange (IDX).

2. MATERIALS AND METHODS

2.1 Materials

The stock price is the stock price that occurs in the secondary market at a certain time determined by market participants at the request and supply of shares [1]. Investors in determining stock price requests first conduct an analysis of stock movements. The indicator used to calculate stock price movements is the closing price.

Relative Strength Index is a technical analysis that analyzes stock price fluctuations over a period of time [2]. Company value is an investor's perception of the company which is often associated with stock prices. A high stock price will result in a high RSI value as well, in the end the better the profits that investors get.

The Relative Strength Index is calculating the ratio between the magnitude of the difference in the rate of increase in price and the level of price decline in a certain time span [3]. The RSI is generally determined at the level of 30-70 points. If the RSI is at the level of 30 oversold or oversold indications. If the RSI at level 70 is overbought or overbought. Formulated formulas are:

$$RSI = 100 - \frac{100}{1+RS} \quad (1)$$

where:

$$RS = \frac{\text{average increasing of closing price X day}}{\text{average decrease of closing price X day}} \quad (2)$$

With RSI we can find out whether a price is overbought or oversold. Thus the analysis of the RSI will have an impact on stock prices. This is in line with previous research conducted by [4,5,6,7,8] that RSI positive effect on stock prices.

Then the factors that influence stock prices other than RSI are Earning Per Share (EPS), which is a ratio that shows how much profit is gained from shares invested in the company. Earnings per share can be used as an indicator in measuring the level of success of the company. EPS is calculated by dividing net income after tax with the number of shares outstanding.

Thus EPS is very important for investors in measuring the success of the company. EPS can reflect the effectiveness and efficiency of a company in utilizing existing assets to make a profit. If high EPS will have an impact on investors to invest in the company. Investments made by investors in the form of purchases of company shares, but conversely if EPS is low, investors will not be interested in buying company shares.

The results of research conducted by Hai and Ping [4] in the sugar industry, chemical industry, food and personal care section, and energy sectors as many as 63 companies listed on KSE showed EPS had a positive effect on stock prices. This research is supported by other studies namely [5] who conducted research on banks in Malaysia found that there was a positive relationship between EPS and stock prices.

Thus the stock price that occurs in the secondary market is influenced by information generated by internal factors and external factors. In internal factors in the form of financial statements which are an illustration of the realization of the company's operational activities that have been carried out, while external factors are factors of investor behavior on stock demand and supply.

2.2 Methods

The research method used in this research is descriptive analysis method. The research object consists of the Relative Strength Index, Earning Per Share and Stock Price. Data used secondary

data on *Jakarta Islamic Index (JII)* companies listed on the Indonesia Stock Exchange (IDX) from 2013-2016.

The population in this study were all companies listed on *Jakarta Islamic Index (JII)* on the Indonesia Stock Exchange (IDX) during the period 2013-2016. The sampling technique uses a purposive sampling method. Based on the results of processing obtained as many as 13 companies from 15 companies, the two company the date uncompleted. As for those who fulfill the criteria consist of Table 1.

2.3 Variable Operationalization

In this study the following variables are operationalized:

- Independent variable consisting of Relative Strength Index (X1), Earning Per share (X2).
- Dependent variables include average closing stock prices 10 days before and have been issued financial statements (Y).

2.4 Analysis Data

Panel data is a combination of time series data and cross section data. The use of panel data will increase the number of observations so that it will increase the degree of freedom. In data processing carried out in this study using three approaches: 1). Common Effect; 2). Fixed effect; and 3). Random effect. Then to choose the right model in processing this panel data, a model test is carried out in the form of: 1). Chow test; 2). Hausman test; and 3). Langrange Multiplier (LM) Test.

3. RESULTS

The first test is the chow test, this test is done to choose whether the estimation is done using the Common effect model or the Fixed effect model. Based on the chow test on the data shows that regression estimation is better done using fixed effect.

The results of the chow test in Table 2 show that the probability of cross section $F < 0.05$ which means deciding the use of fixed effects, the next step is to test the selection of estimates between fixed effects and random effects using the Hausman test.

The Hausman test results in Table 3 show that the cross-section probability is > 0.05 , which means it shows the use of random effects. This shows that regression estimation is better done using the random effect method. This result is in line with the chow test and hausman test which states that the chosen model of the three most likely models is the Random effect model. The next step is to do the Larange multiplier estimation test where the results of this test will determine the end of the model to be used.

The results of the Larange multiplier test in Table 4 show that the value of the cross section probability < 0.05 , which means that the use of random effects is better. Of the three panel data regression models, only common effects and fixed effects allow heterocedasticity, while random effects do not occur. This is because the estimation of common effects and fixed effects still uses the Ordinary Least Square (OLS) approach while the random effect uses Generalized Least Square (GLS) which is one of the regression healing techniques for heterocedasticity.

After getting the right model to estimate regression, the next step is to estimate regression using random effects. For the regression results can be seen in Table 5.

Based on the results of the analysis using Eviews 10 in Table 5, the results show that the Relative Strength Index (RSI) and Earning Per Share variables affect the stock price as illustrated in the formula that can be generated based on the analysis results as follows:

$$Y = 2.488977 + 0.299X1 + 0.868X2$$

where :

$$\begin{aligned} Y &= \text{stock price} \\ \alpha &= 2.488977 \\ X1 \text{ (RSI)} &= 0.299 \\ X2 \text{ (EPS)} &= 0.868 \end{aligned}$$

From the regression equation above, it can be concluded that the relative strength index and earnings per share variables have a significant positive effect on stock prices. This shows that each addition of the RSI and EPS values will cause an increase in the stock price.

3.1 Test F Statistics

The statistical test result F shows the prob value. F (Statistics) is 0.0000 smaller than the significance level of 0.05 so it can be concluded

that the regression model that is estimated to be feasible is used to explain the effect of the Relative strength index variables and earnings per share on stock prices.

3.2 Significance Test t

T significance test is used to analyze the effect of independent variables on the dependent variable. The value of prob t-stat from the independent variable RSI of 0.0301 is smaller than 0.05 so that the RSI variable has a significant effect on the dependent variable stock

price at alpha 5% or in other words, the Relative Strength Index has a significant effect on stock prices in listed companies in *Jakarta Islamic Index (JII)* with a 95% confidence level. Furthermore, the EPS variable is 0.0000 smaller than 0.05 so that the EPS variable has a significant effect on the dependent variable of stock price at alpha 5% or in other words Earning Per Share (EPS) has a significant effect on stock prices in companies registered with *Jakarta Islamic Index (JII)* listed on the Exchange Indonesian Securities (IDX) with a 95% confidence level.

Table 1. Sample of Jakarta Islamic Index (JII) for 2013-2016

No.	Code	Company
1	ADRO	Adaro Energy Tbk
2	AKRA	AKR Corporindo Tbk
3	ASII	Astra International, Tbk
4	BSDE	Bumi Serpong Damai Tbk
5	ICBP	Indofood CBP Sukses Makmur Tbk
6	INDF	Indofood Sukses Makmur, Tbk
7	KLBF	Kalbe Farma, Tbk
8	LSIP	PP London Sumatra Indonesia Tbk
9	PGAS	Perusahaan Gas Negara (Persero), Tbk
10	SMGR	Semen Indonesia Persero, Tbk
11	TLKM	Telekomunikasi Indonesia (Persero), Tbk
12	UNTR	United Tractors, Tbk
13	UNVR	Unilever Indonesia, Tbk

Source: www.idx.com

Table 2. Chow test

Effects test	Statistic	d.f.	Prob.
Cross-section F	20.935975	(12,37)	0.0000
Cross-section Chi-square	106.748031	12	0.0000

Table 3. Hausman test

Test summary	Chi-sq. statistic	Chi-sq. d.f.	Prob.
Cross-section random	2.046097	2	0.3595

Table 4. Larange multiplier

	Test hypothesis		
	Cross-section	Time	Both
Breusch-pagan	110.2017 (0.0000)	2.133215 (0.1441)	112.3349 (0.0000)

Table 5. Results of rregression with random effect method

Variable	Coefficient	Std. error	t-Statistic	Prob.
C	2.488977	0.756165	3.291577	0.0019
LOG(RSI)	0.298888	0.133801	2.233821	0.0301
LOG(EPS)	0.868409	0.092069	9.432193	0.0000

4. DISCUSSION

The coefficient of determination can be measured by the value of R-Square. Based on the results of data processing with the Random Effect model, it is known that R-Square 0.65 shows that the proportion of the influence of the Relative Strength Index variable and earning per share on the stock price is 65%. Then the influence of another variable of 35% is thought to influence the volume of stock trading, return on investment, return on equity and national economic development.

Then partially the Relative Strength Index has a significant positive effect on Stock Prices in *Jakarta Islamic Index (JII)* companies registered in the Indonesian Securities Stock Exchange (IDX) for the 2013-2016 period, this is in line with the results of research by several authors [4,5,6,7,8]. Furthermore, Earning Per Share has a significant effect on Stock Prices in *Jakarta Islamic Index (JII)* companies listed on the Indonesia Stock Exchange (IDX) for the 2013-2016 period, in accordance with the results of research by Hunjra et al. [9] and Seetharaman and Raj [10].

5. CONCLUSION

Based on the results of processing that the simultaneous Relative Strength Index and Earning Per Share significantly influence the Share Price of companies listed on the Jakarta Islamic Index (JII) 2013-2016. While partially the Relative Strength Index has a significant positive effect on Share Prices, as well as Earning per Share has a significant effect on the Share Prices of companies listed on the 2013-2016 Jakarta Islamic Index (JII). Then the biggest contribution affecting the stock price is EPS within the meaning investors in making decisions, stock returns are described by the EPS used as a basic consideration in making investment decisions.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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APPENDIX

Appendix 1. Data on calculation of relative strength index for 13 companies in Jakarta Islamic Index

No	Company	Code	Years			
			2013	2014	2015	2016
1	Adaro Energy Tbk	ADRO	38.24	64.81	42.65	59.3
2	AKR Corporindo Tbk	AKRA	29.27	27.66	62.7	37.84
3	Astra International, Tbk	ASII	64.86	58.18	52.13	60.24
4	Bumi Serpong Damai Tbk	BSDE	28.95	46.81	59.2	45.37
5	Indofood CBP Sukses Makmur Tbk	ICBP	58.33	69.64	56.36	50
6	Indofood Sukses Makmur, Tbk	INDF	50	50	58.56	52.88
7	Kalbe Farma, Tbk	KLBF	55.17	57.47	46	45.78
8	Lippo Karawaci, Tbk	LSIP	44.44	33.33	26.73	30
9	Perusahaan Gas Negara (Persero), Tbk	PGAS	27.78	51.28	52.6	52.48
10	Semen Indonesia Persero, Tbk	SMGR	81.4	41.67	57.64	54.05
11	Telekomunikasi Indonesia (Persero), Tbk	TLKM	55.56	45.83	62.41	54.17
12	United Tractors, Tbk	UNTR	56.06	40	51.08	41.33
13	Unilever Indonesia, Tbk	UNVR	51.92	56.35	52.5	37.28

Source: Output Calculation Results RSI of stock exchange Indonesia

Appendix 2. Data earnnig per share companies in Jakarta Islamic Index

No	Company	Code	Years			
			2013	2014	2015	2016
1	Adaro Energy Tbk	ADRO	88.7	69.17	65.74	140.56
2	AKR Corporindo Tbk	AKRA	167.04	206.99	262.36	253.22
3	Astra International, Tbk	ASII	479.63	473.8	357.31	374.37
4	Bumi Serpong Damai Tbk	BSDE	166.06	217.53	122.17	105.86
5	Indofood CBP Sukses Makmur Tbk	ICBP	381.63	446.62	514.62	308.73
6	Indofood Sukses Makmur, Tbk	INDF	285.16	442.5	338.02	472.02
7	Kalbe Farma, Tbk	KLBF	37.8	44.05	42.76	49.06
8	Lippo Karawaci, Tbk	LSIP	112.78	134.36	91.36	87.04
9	Perusahaan Gas Negara (Persero), Tbk	PGAS	435.56	370.78	242.58	168.67
10	Semen Indonesia Persero, Tbk	SMGR	965.37	938.35	762.28	762.3
11	Telekomunikasi Indonesia (Persero), Tbk	TLKM	140.92	145.22	153.66	171.93
12	United Tractors, Tbk	UNTR	1295.85	1439.52	1033.07	1341.03
13	Unilever Indonesia, Tbk	UNVR	701.52	752.1	766.95	837.57

Source: IDX stock exchange Indonesia

Appendix 3. Company stock price closing price per 31 Desember 2013, 2014, 2015, 2016

No.	Nama perusahaan	Kode	Tahun			
			2013	2014	2015	2016
1	Adaro Energy Tbk	ADRO	1.090	1.040	515	1.695
2	AKR Corporindo Tbk	AKRA	4.375	4.120	7.175	6.000
3	Astra International, Tbk	ASII	6.800	7.425	6.000	8.275
4	Bumi Serpong Damai Tbk	BSDE	1.290	1.805	1.800	1.755
5	Indofood CBP Sukses Makmur Tbk	ICBP	10.200	13.100	13.475	8.575
6	Indofood Sukses Makmur, Tbk	INDF	6.600	6.750	5.175	7.925
7	Kalbe Farma, Tbk	KLBF	1.250	1.830	1.320	1.515
8	Lippo Karawaci, Tbk	LSIP	910	1.020	1.035	720
9	Perusahaan Gas Negara (Persero), Tbk	PGAS	4.475	6.000	2.745	2.700

No.	Nama perusahaan	Kode	Tahun			
			2013	2014	2015	2016
10	Semen Indonesia Persero, Tbk	SMGR	14.150	16.200	11.400	9.175
11	Telekomunikasi Indonesia (Persero), Tbk	TLKM	2.150	2.865	3.105	3.980
12	United Tractors, Tbk	UNTR	19.000	17.350	16.950	21.250
13	Unilever Indonesia, Tbk	UNVR	26.000	32.300	37.000	38.800

Source: IDX stock exchange Indonesia

Model Common Effect

Dependent Variable: LOG(stock price)

Method: Panel Least Squares

Date: 10/21/18 Time: 21:39

Sample: 2013 2016

Periods included: 4

Cross-sections included: 13

Total panel (balanced) observations: 52

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(RSI)	0.713465	0.090089	7.919568	0.0000
LOG(EPS)	1.022996	0.062428	16.38683	0.0000
R-squared	0.825534	Mean dependent var		8.497462
Adjusted R-squared	0.822045	S.D. dependent var		1.064125
S.E. of regression	0.448898	Akaike info criterion		1.273660
Sum squared resid	10.07547	Schwarz criterion		1.348708
Log likelihood	-31.11516	Hannan-Quinn criter.		1.302431
Durbin-Watson stat	0.335795			

Fixed Effect

Dependent Variable: LOG(stock price)

Method: Panel Least Squares

Date: 10/21/18 Time: 21:40

Sample: 2013 2016

Periods included: 4

Cross-sections included: 13

Total panel (balanced) observations: 52

Variable	Coefficient	Std. error	t-Statistic	Prob.
C	3.229296	0.913678	3.534392	0.0011
LOG(RSI)	0.289381	0.135197	2.140441	0.0390
LOG(EPS)	0.742231	0.127619	5.815968	0.0000

Effects specification

Cross-section fixed (dummy variables)

R-squared	0.978808	Mean dependent var	8.497462
Adjusted R-squared	0.970789	S.D. dependent var	1.064125
S.E. of regression	0.181872	Akaike info criterion	-0.334430
Sum squared resid	1.223864	Schwarz criterion	0.228428
Log likelihood	23.69519	Hannan-Quinn criter.	-0.118644
F-statistic	122.0656	Durbin-Watson stat	2.294092
Prob(F-statistic)	0.000000		

Random Effect

Dependent Variable: LOG(Stock Price)
 Method: Panel EGLS (Cross-section random effects)
 Date: 10/21/18 Time: 21:41
 Sample: 2013 2016
 Periods included: 4
 Cross-sections included: 13
 Total panel (balanced) observations: 52
 Swamy and Arora estimator of component variances

Variable	Coefficient	Std. error	t-statistic	Prob.
C	2.488977	0.756165	3.291577	0.0019
LOG(RSI)	0.298888	0.133801	2.233821	0.0301
LOG(EPS)	0.868409	0.092069	9.432193	0.0000
Effects specification				
			S.D.	Rho
Cross-section random			0.442714	0.8556
Idiosyncratic random			0.181872	0.1444
Weighted statistics				
R-squared	0.653722	Mean dependent var		1.709733
Adjusted R-squared	0.639588	S.D. dependent var		0.303089
S.E. of regression	0.181957	Sum squared resid		1.622318
F-statistic	46.25235	Durbin-Watson stat		1.683384
Prob(F-statistic)	0.000000			
Unweighted statistics				
R-squared	0.821649	Mean dependent var		8.497462
Sum squared resid	10.29982	Durbin-Watson stat		0.265149

Pengujian Model

1. Chow test

Redundant Fixed Effects Tests
 Equation: EQ02
 Test cross-section fixed effects

Effects test	Statistic	d.f.	Prob.
Cross-section F	20.935975	(12,37)	0.0000
Cross-section Chi-square	106.748031	12	0.0000

Cross-section fixed effects test equation:
 Dependent Variable: LOG(Stock Price)
 Method: Panel Least Squares
 Date: 10/21/18 Time: 21:46
 Sample: 2013 2016
 Periods included: 4
 Cross-sections included: 13
 Total panel (balanced) observations: 52

Variable	Coefficient	Std. error	t-statistic	Prob.
C	1.847569	1.107481	1.668262	0.1016
LOG(RSI)	0.283021	0.272783	1.037531	0.3046
LOG(EPS)	0.994652	0.063653	15.62618	0.0000
R-squared	0.834911	Mean dependent var		8.497462
Adjusted R-squared	0.828173	S.D. dependent var		1.064125
S.E. of regression	0.441102	Akaike info criterion		1.256878

Sum squared resid	9.533958	Schwarz criterion	1.369450
Log likelihood	-29.67882	Hannan-Quinn criter.	1.300035
F-statistic	123.9049	Durbin-Watson stat	0.291996
Prob(F-statistic)	0.000000		

2. Hausman test

Correlated Random Effects - Hausman Test
Equation: EQ03
Test cross-section random effects

Test summary		Chi-sq. statistic	Chi-sq. d.f.	Prob.
Cross-section random		2.046097	2	0.3595
Cross-section random effects test comparisons:				
Variable	Fixed	Random	Var(Diff.)	Prob.
LOG(RSI)	0.289381	0.298888	0.000375	0.6236
LOG(EPS)	0.742231	0.868409	0.007810	0.1534

Cross-section random effects test equation:
Dependent Variable: LOG(Stock Price)
Method: Panel Least Squares
Date: 10/21/18 Time: 21:48
Sample: 2013 2016
Periods included: 4
Cross-sections included: 13
Total panel (balanced) observations: 52

Variable	Coefficient	Std. error	t-statistic	Prob.
C	3.229296	0.913678	3.534392	0.0011
LOG(RSI)	0.289381	0.135197	2.140441	0.0390
LOG(EPS)	0.742231	0.127619	5.815968	0.0000

Effects specification

Cross-section fixed (dummy variables)			
R-squared	0.978808	Mean dependent var	8.497462
Adjusted R-squared	0.970789	S.D. dependent var	1.064125
S.E. of regression	0.181872	Akaike info criterion	-0.334430
Sum squared resid	1.223864	Schwarz criterion	0.228428
Log likelihood	23.69519	Hannan-Quinn criter.	-0.118644
F-statistic	122.0656	Durbin-Watson stat	2.294092
Prob(F-statistic)	0.000000		

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