To Define Window Dressing in The State Owned Enterprises and Private Companies

(Case Study in Indonesia Stock Exchange LQ45)

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Abstract: Window dressing in capital market can be defined as the activities of company to increase the stock price. This study was conducted to observe all the activities of window dressing in some companies listed in stock market. The detection of window dressing in this study was focused based on the samples from state owned companies (Telekomunikasi Indonesia Tbk, and Adhi Karya Tbk) and private sector from Astra Agro Lestari (Agriculture Industry). GARCH model was used while window dressing was analyzed by using the method given by Owens and Wu (2011). Results indicate that the best model to explain the behavior of volatility is AR(1)-GARCH(1,1). However, window dressing for three companies mentioned was occurred in 2014-2016; 2014 and 2016, respectively. In additional to that the t-test, was found to be significant for the three companies while the short-term average was above than the long-term average of the year.

Key-Words: Window dressing; Capital market; GARCH, Volatility; MAPE.

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1 Introduction

Investment managers in several companies attempt to make their portfolio to be appeared as promising to the investors and shareholders. One of the strategies to make that is window dressing. Investment managers would transform the portfolio to make it look favorable and publish the report that is not in accordance with the firm's performance and ability. This practice deceives the investors (Agarwal, Gay, & Ling, 2014). In the practice of window dressing, investment managers would likely purchase or sell shares owned for several days before the reporting date to cover their performances during the unreported period (Choi & Chhabria, 2013). One of the main reasons of this practice is, the investment managers must achieve the performance target at the end of the year (Morey & O'neal, 2006). If the target is not achieved by the end of the year, the tendency is to change the portfolio in such practice to cover the target (Agarwal, Gay, & Ling, 2014). Window Dressing can occur because the investor only knows the objects of the report for certain time rather than the entire time.

In the capital market, investment managers sometimes are influenced by the company's management as policy makers. Company's management wants that the price must increase especially at the end of the year. The increase of stocks must build the value of stock higher in financial statement. Practically, this event happens especially at the end of every year, before 31st of December. The signal of window dressing indicates the increase of stock price sometimes significantly higher than the fair value of the company's average price in the year. The increase of stock price is supported by big volume or sometime very small volume in daily transaction. Big volume in daily transaction is found in the big capitalization stock transaction but might be happened in the small capitalization stock with lower stock transaction volume. In this case, the price can be designed and built by spending small amount of money as low pressure indication is predicted. The company's management asked certain security houses to help in making the price.

Though, the study of window dressing is important and interesting, it has a negative impact to the image of the capital market because sometimes the price built in stock market is irrelevant compare to the intrinsic value of stocks and the average price of stock in a month or semester event in a year. These reasons motivated to look at the inside of stock market more deeply. In Indonesia, varieties of stocks are listed in stock market. It is observed that the most famous and important stocks are the state owned enterprises and big market capitalization private companies.

It is Interesting to understand the characteristics of state owned enterprises in doing window dressing. The question is, "how important for state owned

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enterprises to do window dressing regarding the characters of ownerships and the objectives of state owned company establishments?" State owned companies are established to manage the assets of a country in order to have a good value and growth of earning to use all the results of growth for social life and to finance the government spending. In that case, it is almost impossible for state owned companies to use window dressing as the strategy. After the companies are listed in the stock market, no flow of money comes into the company. Transaction cash flow moves from certain investors including public fund managers to others, which becomes different when the company raise the money through capital market by using Initial Public Offering (IPO) process. In IPO, the state owned companies receive the money by selling new stocks to the capital market's investors as additional capital in statement of financial position. On the other hand, different things happen to the private companies listed in stock exchange. The increase of stock price can be recognized as the benefit for asset valuation especially in outstanding shares valuation. If the price increase, value of outstanding share will increase. The impact of the increment goes to the value of asset. In fact, value of asset is important for the private company to build the image and price of company, to attract more investors to come into company directly through project development or by buying the stocks in the capital market through next corporate action and right issue. Right issue is one of the strategies for almost all the listed private companies in raising funds. Uniquely, the listed private companies have no limitation for fresh money. As long as the stock provides benefits to raise the money, private company use it as the first priority to watch than to improve the performance or the company. The performance of the company used to support the corporate action in raising money, not to maintain the stability of the company. That is why, somehow, we must look at the private company as the company's trader. Build, have the money, and leave it as it is.

How to look at all of those predictions in the capital market? The black and white in capital market can be taken based on the data at the end of every year. Almost all stock prices increase in normal condition of the country. In the stable economy condition, stable political condition, and clear regulation, we can see the recovery of stock prices at the end of the year between 26th and 31st of December. In the capital market window dressing were investigated by having 3000 equity mutual fund data from 1995 to 2004. The data were used to investigate the patterns and trend of Investment managers in buying and selling, and also to investigate the existing window dressing by analyzing the significant changes of shareholders that could be related to the target performance (Choi & Chhabria, 2013). Window dressing is defined as the asset on every end-of-quarter asset which is higher than the quarterly average asset (Allen & Saunders, 1992). Kotomin and Winters (2006) defined window dressing by evaluating the asset and liabilities based on weekly data. Window dressing should normally happen in private companies. There are several basic concepts, such as 1) the private company wants to show a good financial position to the shareholder, 2) the private company wants to inform that the performance of the company is good, and 3) the private company wants to show that stock price is outperformed.

2. Method and Statistical Analysis

2.1 Sample

The statement above pushed us to conduct the preliminary research or observation by analyzing some samples from Indonesian stock market. This paper used three stocks listed in Indonesia Stock Exchange, which are Telekomunikasi Indonesia Tbk, Adhi Karya Tbk, and Astra Agro Lestari Tbk. Adhi Karya Tbk and Telekomunikasi Indonesia Tbk are the state owned enterprises in Indonesia. Adhi Karya Tbk is part of infrastructure industry. Observations show that this companies' stock prices are very active because of the performance of the companies, not as the impact of corporate action. Actually, it is very hard to have the decision on corporate action in the company, and also interesting to prove whether window dressing is happened or not. Astra Agro Lestari Tbk is a part of agriculture and plantation sector. It produces, mostly, the crude palm oil for consumption. This company also the subsidiary of Astra International Tbk. The influence of Astra International Tbk may reflect stock volatility of the company. Telekomunikasi Indonesia Tbk is a telecommunication company. It is also included in the group of conglomerate. At the end of December, the price of stocks may also be influenced by the group's characteristics as no limitation of fresh money. In this research, the data are selected from the period of 1st January 2014 to 31st December 2016.

2.2 Formulated GARCH model

How to answer the question, "in what company window dressing generally happened?" This study used volatility as the object of research in order to have the picture of heteroscedasticity of the stock price. The volatility indicator in this study is reflected by Generalized Conditionally Heteroscedasticity (GARCH) (Bollerslev, 1986; Tsay, 2005). Actually GARCH is the development of Autoregressive Conditionally Heteroscedasticity (ARCH) (Engle, 1982, 2001; Weiss, 1984). GARCH was used in this study because of the completeness of variable used in calculation.

Previous researches on capital market also support the background of this research. It was found that investment managers should concern other strategies for evaluating the share price to gain valuable information for the company. In this era, many economic practices use statistical theorem to forecast the market condition (Dzikevivius & Saranda, 2011), such as GARCH model which is used in this research to forecast the share price and find out the indication of Window Dressing. As the Share prices are obtained as a set of data within a specific period of time, it is called time series data (Montgomery et al., 2008). Time series data are presented annually, semiannually, quarterly, monthly, weekly, daily, etc. (Wei, 2006; Box & Pierce, 1970).

This study used daily time serie data from three companies having varieties backgrounds and types of industries. In the process of analysis, before the best GARCH model was formulated, the collected data were tested based on some assumptions. After testing and checking, GARCH model that fits based on the criteria was chosen as the tool of volatility forecast measurement. We assumed that closing stock prices observed in the study have the heterogeneity of variance which fluctuate rapidly from time to time. This predicted fluctuation, perhaps caused by many variables, for both inside and outside of the company means the corporate strategy and condition of external factors.

2.3 Basic concept of Generalized ARCH (GARCH) Model

GARCH model was built to avoid the order of ARCH model which is too high. GARCH model is not only to see the relationship among some residuals, but also depend on some past residuals. GARCH was introduced by Bollerslev (1986).

GARCH model with degree p and q is defined as the steps:

1. x_t is the conditional mean as calculated based on the equation below.

$$x_t = \delta + \sum_{i=1}^{p} \phi_i x_{t-i} - \sum_{i=1}^{q} \theta_i \varepsilon_{t-1} + \varepsilon_t$$

where : $\varepsilon_t \sim N(0, \sigma^2)$

2. Formulated GARCH model based on the data in above equation.

$$\sigma_t^2 = \omega + \sum_{i=1}^{q} \lambda_i \varepsilon_{t-i}^2 + \sum_{j=1}^{p} \beta_j \sigma^2{}_{t-j}$$

Where the present values of the conditional variance was parameterized depending on the q-lag from the squares residual and the p-lag of the conditional variance was written as GARCH (p, q). GARCH model is formed if its time varying conditional variance is heteroscedastic with both auto regression and moving average (Wang, 2009; Tsay, 2005; Engle, 2001). In the process of analysis, there are some steps to be conducted. The first step is to plot the time series data to measure the behavior and prepare the data to be processed in the next step. The second step is to check the stationary data. The stationary in mean is checked through the plot of the data, statistical test by using Augmented Dickey Fuller (ADF) test, Autocorrelation Function (ACF) plot of the data, and by checking white noise data. The stationary in variance is checked through the plot of the data. If the data are nonstationary, differencing process of the data are used. If the data are stationary, autocorrelation function (ACF) and partial autocorrelation function (PACF) are used to estimate the order of ARIMA (Pankratz, 1991; Brockwell & Davis, 2002; Brooks, 2014). The third step is to estimate and test the parameters, to diagnose and test the residuals, and to select the best model based on the criteria of the smallest values of Akaike Info Criterion (AIC) or Schwartz Criterion. The residuals obtained from the best ARIMA model are checked by using Lagrange Multiplier (LM) test to know whether they have heteroscedasticity or not. If there is heteroscedasticity, the data are modeled by using GARCH model. The fourth step is to estimate and test the parameters of the model.

2.4 Window Dressing Analysis

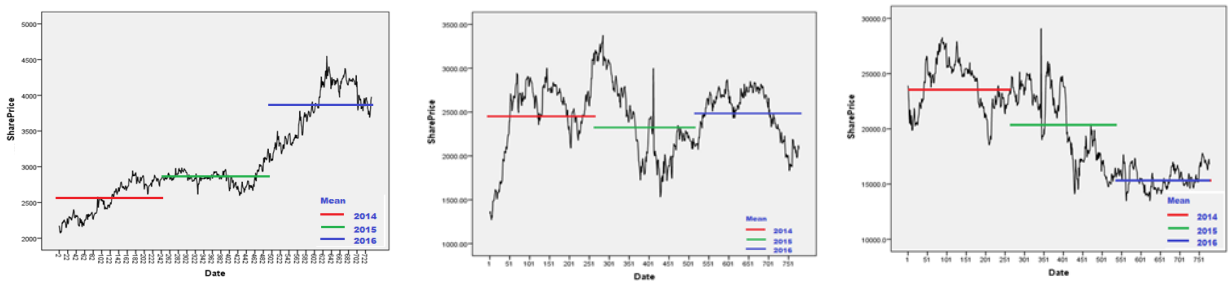
The model of window dressing used in this research is based on the formula used by private company to set business strategy. It does make sense because window dressing used to help the company in modifying the financial statement especially statement of financial position, income statement, and net asset value of funds in investment company. Conceptually, Window Dressing is the deviation of short-term average (monthly) from its long-term average (yearly) (Owens & Wu, 2011). Based on the concept, the long-term level is the respective year and the short-term level is the months of the year. Therefore, first we calculate the average of the year and the average of the months in the year and then the deviation of the month with respect to the average of the year is found. After that, the deviation is divided by the average of the year and multiplied by 100 to find the percentage (%) deviation from the average of the year. Based on this concept, the behavior of the share price can be compared, whether it is above or below the average of the share price of the year. If there is an indication of window dressing at the end of the year, it will be checked by using t-test to examine the null hypotheses as no window dressing (Ho:$\mu_D = \mu_Y$) against the hypothesis as there is a window dressing (Ha: $\mu_D > \mu_Y$), where μ_D is the average of the month of December and μ_Y is the average of the year.

3 Results and Discussion

This research identifies the data of 3 (three) listed companies in Indonesia Stock Exchange Index which

are the closing share price of Telekomunikasi Indonesia Tbk, Adhi Karya Tbk, and Astra Agro Lestari Tbk. The data used in this research are verified by checking the stationary data, (1) by looking at the plot of the data, from where we can judge whether the data are stationary or not, and (2) by using statistical test, Augmented Dicky Fuller test, and other relevant tools.

From the plot of the data presented in Figure 1(a), Telekomunikasi Indonesia Tbk shows that the data are nonstationary, in the first year (2014) the data were up trend, then the trend became plate in the second year (2015), and in the third year (2016) the data were increased up to August and then decreased down to December. It confirms that the data are not constant. So the data of Telekomunikasi Indonesia Tbk are nonstationary. Plot of the data in Figure 1(b), Adhi Karya Tbk shows that the data were also very volatile with up and down train, which confirms that the data were not constant for several numbers. So the data of Adhi Karya Tbk are also nonstationary. From the plot of data shown in Figure 1(c), Astra Agro Lestari Tbk shows up and down moves for the first two years (2014 and 2015) and decrease the fluctuation in the third year (2016). The data shows the fluctuation significantly. So the data of Astra Agro Lestari Tbk are also nonstationary.



(a) (b) (c)

Figure 1(a): Plot of the data of Telekomunikasi Indonesia Tbk **(b)** Adhi Karya Tbk, and **(c)** Astra Agro Lestari Tbk the Year Average (Mean) for 2014, 2015, and 2016

Table 1: Augmented Dickey-Fuller (ADF) Unit Root Test

Type	Data	Lags	Tau	p-value
Mean	Telekomunikasi Indonesia,Tbk	3	-1.0113	0.7500
	Adhi Karya,Tbk	3	-3.0586	0.0308
	Astra Agro Lestari,Tbk	3	-1.6363	0.4636

Table 2: The parameters Estimate for Intercepts

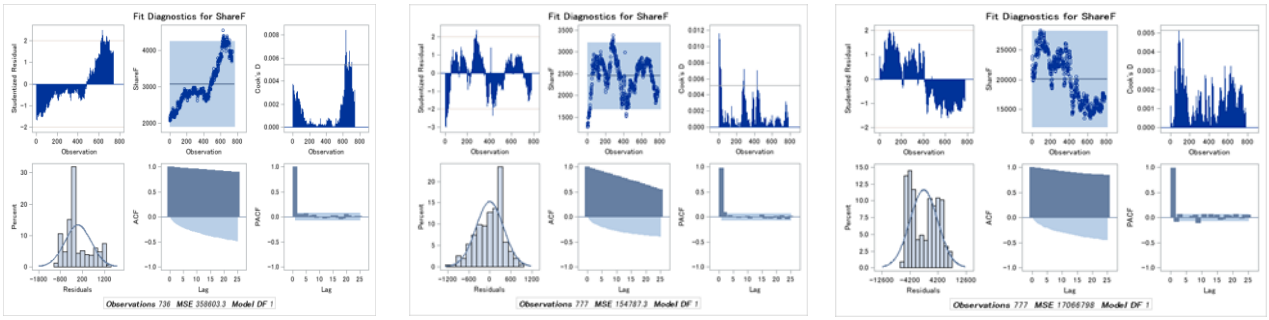
Variable	Data	DF	Estimate	Standard Error	t-value	p-value
Intercept	Telekomunikasi Indonesia Tbk	1	3061	22.0733	138.69	< 0.0001
	Adhi KaryaTbk	1	2449	14.1142	173.50	<0.0001
	Astra Agro Lestari Tbk	1	20041	148.2059	148.21	<0.0001

The test statistic for nonstationary data (ADF test) presented in Table 1 shows that the data (p-values) for Telekomunikasi Indonesia Tbk, Adhi Karya Tbk, and Astra Agro Lestari Tbk are 0.7500, 0.0308, and 0.4636 respectively. From this test, it is found that the data of Telekomunikasi Indonesia Tbk and Astra Agro Lestari Tbk are nonsignificant which temporary concluded that the data are nonstationary, but different for the data of Adhi Karya Tbk which is significant, means that the data are stationary.

Based on Table 2, the parameters Estimate for Intercepts shows that the test of statistics for the intercepts (Ho: intercept=0) are significant for all with the p-values<0.0001. These mean that all the intercepts are different from zero.

From Figure 2(a), for data of Telekomunikasi Indonesia Tbk, the Autocorrelation Function (ACF) indicates that the series is nonstationary, since the ACF decays very slowly.

Based on Figure 2(b), for the data of Adhi Karya Tbk, the Autocorrelation Function (ACF) indicates that the series is nonstationary, since the ACF decay is very slow. As presented in Figure 2(c), for data Astra Agro Lestari Tbk, the Autocorrelation Function (ACF) indicates that the series is nonstationary, since the ACF decays slowly. The last process in checking the stationary of price data for three selected stocks showed that none of them is stationary since p-value of the stocks are less than 0.0001 as presented in Table 3(a), Table 3(b), and Table 3(c).



(a) (b) (c)

Figure 2(a): Correlation analysis for data Telekomunikasi Indonesia Tbk, **(b)** Adhi Karya Tbk, and **(c)** Astra Agro Lestari Tb.

Table 3(a): Checking for white noise data of Telekomunikasi Indonesia Tbk

To lag	Chi-Square	DF	p-value	Autocorrelation					
6	4278.27	6	<0.0001	0.993	0.987	0.982	0.977	0.974	0.970
12	8385.92	12	<0.0001	0.966	0.963	0.959	0.953	0.951	0.947
18	9999.99	18	<0.0001	0.942	0.938	0.934	0.930	0.927	0.922
24	9999.99	24	<0.0001	0.917	0.913	0.909	0.906	0.902	0.898

Table 3(b): Checking for white noise data of Adhi Karya Tbk

To lag	Chi-Square	DF	p-value	Autocorrelation					
6	4082.50	6	<0.0001	0.977	0.958	0.940	0.923	0.905	0.889
12	7319.74	12	<0.0001	0.871	0.853	0.835	0.818	0.800	0.782
18	9805.49	18	<0.0001	0.764	0.747	0.731	0.714	0.696	0.677
24	9999.99	24	<0.0001	0.658	0.640	0.620	0.603	0.584	0.564

Table 3(c): Checking for white noise data of Astra Agro Lestari Tbk

To lag	Chi-Square	DF	p-value	Autocorrelation					
6	4430.14	6	<0.0001	0.992	0.983	0.975	0.967	0.959	0.951
12	8471.87	12	<0.0001	0.943	0.936	0.928	0.920	0.912	0.905
18	9999.99	18	<0.0001	0.899	0.893	0.888	0.882	0.876	0.870
24	9999.99	24	<0.0001	0.866	0.861	0.858	0.854	0.851	0.848

Since the series data are nonstationary, next step is to transform all the data into a stationary series by differencing. By using differencing with lag=2 (d=2), the data of Telekomunikasi Indonesia Tbk, Adhi Karya Tbk, and Astra Agro Lestari Tbk attained as stationary. The stationary data can be seen from the behavior of the residual data after differencing which are distributed around zero (Figure 3(a), 3(b) and 3(c)), for residual data of Telekomunikasi Indonesia Tbk, Adhi Karya Tbk, and Astra Agro Lestari Tbk respectively. The next step in the Box-Jenkins methodology is to examine the patterns in the autocorrelation lag to choose candidate ARMA models for these series. The partial autocorrelation function plots are also useful aids in identifying appropriate ARMA models for these series. The check for white noise, shown in Table 4(a), 4(b), and 4(c), indicate that the change in data of Telekomunikasi Indonesia Tbk, Adhi Karya Tbk, and Astra Agro Lestari Tbk are highly autocorrelated. Thus, autocorrelation models, AR (2) models, for data of Telekomunikasi Indonesia Tbk, Adhi Karya Tbk, and Astra Agro Lestari Tbk, are used. It might be a suitable candidate model to fit for these processes.

3.1 Finding the heteroscedasticity in the three selected stocks.

Tables 5(a), 5(b) and 5(c) present Portmanteau Q and Lagrange Multiplier Test for ARCH effects. The Q statistics are calculated from the squared residuals and are used to test for nonlinear effects (for example, GARCH effects) of the residuals. One of the key assumptions on the Ordinary Least Squares (OLS) regression is that the error has the same variance (homoscedasticity). If the error variance is not constant throughout the sample, the data are said to be heteroscedastic. Since OLS assumes constant variance, the present of heteroscedasticity cause the application of OLS for estimation as inefficient. Models are taken into account because of the presence of heteroscedasticity which should be applied to make more efficient use of data. In regression analysis, general linear model (GLM) can be used to cope with this heteroscedasticity problem. In time series analysis, some methods, such as GARCH models, can

be used. Therefore, before using the GARCH model, the presence of heteroscedasticity needs to be checked. Lagrange multiplier test can be used to check the presence of heteroscedasticity. The following tables (Table 5(a), 5(b), and 5(c)) are the results of the ARCH effect.

From the test statistics of Portmanteau Q and Lagrange Multiplier Tests, the null hypothesis was rejected as there are no white noise in the three selected stocks since the p-values in Tables 5(a), 5(b), and 5(c) are less than 0.0001. Therefore, we can conclude that the data of Telekomunikasi Indonesia Tbk, data of Adhi Karya Tbk, and data of Astra Agro Lestari Tbk have heteroscedasticity. Thus, a model is needed which can cope with the problems of heteroscedastic variance. In this case GARCH model was used to explain the behavior of the data of the three selected stocks. All approaches used in the research show that the three selected stocks content heteroscedasticity but only Telekomunikasi Indonesia Tbk has the signal that this company contents highest indication of window dressing. From Table 6 below, Telekomunikasi Indonesia Tbk has Mean Absolute Percentage Error (MAPE) as 1.16 compare to Adhi Karya Tbk which has MAPE as 1.79 and Astra Agro Lestari Tbk which has MAPE as 1.73. The R-squares of AR(1)-GARCH(1,1) model for data Telekomunikasi Indonesia Tbk, Adhi Karya Tbk, and Astra Agro Lestari Tbk are 0.99, 0.97, and 0.98 respectively. These means that 99% of the variation of data for Telekomunikasi Indonesia Tbk can be explained by the model; 97% of the variation of data for Adhi Karya Tbk can be explained by the model; and 98% of the variation of data for Astra Agro Lestari Tbk can be explained by the model. These very high R-Square values indicate that the model AR(1)-GARCH(1,1) are very fit to the data of Telekomunikasi Indonesia Tbk, Adhi Karya Tbk, and Astra Agro Lestari Tbk.

The results in Table 6 were calculated by using the formula of GARCH Model derived from the selected data after using difference level 2 as follows: From the results of data analysis of Telekomunikasi Indonesia Tbk by using AR(1)-GARCH(1,1) model, the estimation of mean model (AR1) and variance model GARCH (1,1) are presented in Table 7. Based on the results of analysis given in Table 7, the estimation model AR(1)-GARCH(1,1) is presented as follows:

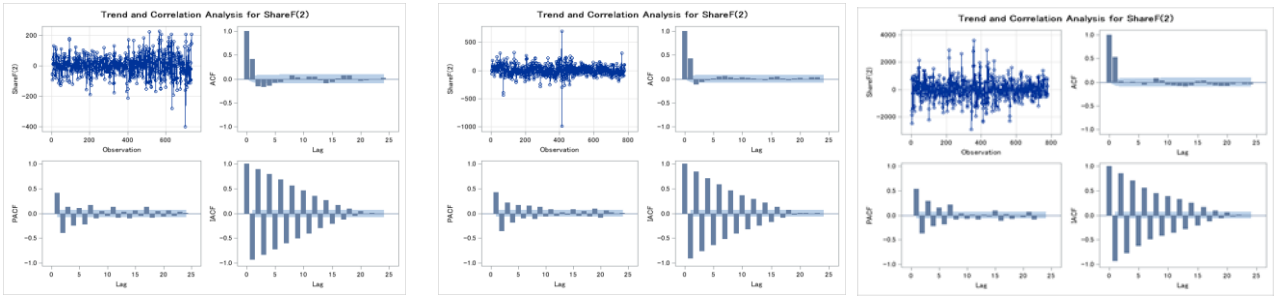
The mean model AR(1):

$$x_t = 2173 - 1.0019\, x_{t-1} + \varepsilon_t$$

and the variance model GARCH(1,1):

$$\sigma_t^2 = 282.4946 + 0.1569\, \varepsilon_{t-1}^2 + 0.7357\, \sigma_{t-1}^2$$

where x_t is the share price of data for Telekomunikasi Indonesia Tbk at time t.



(a) **(b)** **(c)**

Figure 3 (a): Plot of residuals, ACF, PACF, and IACF after differencing with d=2 (differencing with lag=2) for data of Telekomunikasi Indonesia Tbk **(b):** Adhi Karya Tbk, and **(c):** Astra Agro Lestari Tbk

Table 4(a): Checking for white noise data for Telekomunikasi Indonesia Tbk after differencing (d=2)

To lag	Chi-Square	DF	p-value	Autocorrelation					
6	189.45	6	<0.0001	0.414	-0.161	-0.166	-0.140	-0.080	- 0.074
12	197.33	12	<0.0001	-0.018	0.071	0.029	-0.007	0.049	0.043
18	215.48	18	<0.0001	-0.035	-0.090	- 0.066	0.007	0.076	0.068
24	217.71	24	<0.0001	-0.010	-0.038	- 0.027	-0.011	-0.003	0.023

Table 4(b): Checking for white noise data for Adhi Karya Tbk after differencing (d=2)

To lag	Chi-Square	DF	p-value	Autocorrelation					
6	155.96	6	<0.0001	0.432	-0.118	-0.070	-0.032	0.008	0.040
12	160.71	12	<0.0001	0.058	0.032	0.013	0.030	0.022	0.009
18	164.52	18	<0.0001	-0.018	-0.025	0.033	0.045	0.002	-0.027
24	167.05	24	<0.0001	0.003	0.018	-0.017	0.031	0.038	-0.011

Table 4(c): Checking for white noise data for Astra Agro Lestari Tbk after differencing (d=2)

To lag	Chi-Square	DF	p-value	Autocorrelation					
6	221.30	6	<0.0001	0.530	0.014	-0.009	0.005	-0.020	-0.052
12	238.70	12	<0.0001	-0.007	0.080	0.033	-0.055	-0.070	-0.081
18	255.12	18	<0.0001	-0.091	-0.063	0.015	0.037	-0.038	-0.074
24	269.96	24	<0.0001	-0.076	-0.084	-0.039	-0.011	-0.048	-0.042

Table 5(a): ARCH Lagrange Multiplier Test data for Telekomunikasi Indonesia Tbk

Test for Disturbances Based on OLS Residuals				
Order	Q	p-value	LM	p-value
1	675.1760	<0.0001	647.0891	<0.0001
2	1309.1374	<0.0001	652.3676	<0.0001
3	1911.2133	<0.0001	653.3791	<0.0001
4	2480.1076	<0.0001	653.4138	<0.0001
5	3026.1355	<0.0001	653.7225	<0.0001
6	3546.9266	<0.0001	653.7370	<0.0001
7	4048.9336	<0.0001	653.9161	<0.0001
8	4542.9154	<0.0001	654.6921	<0.0001
9	5014.6210	<0.0001	654.8297	<0.0001
10	5458.0136	<0.0001	655.3669	<0.0001
11	5889.4879	<0.0001	655.7642	<0.0001
12	6296.5266	<0.0001	655.9675	<0.0001

Table 5(b): Lagrange Multiplier Test data for Adhi Karya Tbk

Test for ARCH Disturbances Based on OLS Residuals				
Order	Q	p-value	LM	p-value
1	739.1402	<0.0001	701.5839	<0.0001
2	1416.0571	<0.0001	701.5902	<0.0001
3	2034.2396	<0.0001	701.6235	<0.0001
4	2594.4340	<0.0001	701.7554	<0.0001
5	3096.9974	<0.0001	701.9519	<0.0001
6	3552.4281	<0.0001	702.0571	<0.0001
7	3964.4705	<0.0001	702.0619	<0.0001
8	4336.3019	<0.0001	702.0640	<0.0001
9	4675.0712	<0.0001	702.1519	<0.0001
10	4984.1509	<0.0001	702.1524	<0.0001
11	5263.8560	<0.0001	702.2094	<0.0001
12	5518.2277	<0.0001	702.2119	<0.0001

Table 5(c): Lagrange Multiplier Test data for Astra Agro Lestari Tbk

Test for ARCH Disturbances Based on OLS Residuals				
Order	Q	p-value	LM	p-value
1	25.8911	<0.0001	24.8624	<0.0001
2	35.8953	<0.0001	29.8904	<0.0001
3	37.0500	<0.0001	29.8991	<0.0001
4	39.7710	<0.0001	31.0936	<0.0001
5	41.1283	<0.0001	31.3723	<0.0001
6	41.5922	<0.0001	31.3727	<0.0001
7	43.8850	<0.0001	32.5497	<0.0001
8	49.1644	<0.0001	35.0027	<0.0001
9	51.0258	<0.0001	35.0641	<0.0001
10	58.0123	<0.0001	38.3054	<0.0001
11	62.6283	<0.0001	39.1280	<0.0001
12	67.3928	<0.0001	39.8717	<0.0001

Table 7: The Parameter Estimates Model AR(1)-GARCH(1,1) data for Telekomunikasi Indonesia Tbk.

Variable	DF	Estimate	Standard Error	t-value	p-value
Intercept	1	2173	1077	2.02	0.0436
AR1	1	-1.0019	0.002029	-493.77	<.0001
ARCH0	1	282.4946	70.2284	4.02	<.0001
ARCH1	1	0.1569	0.0260	6.03	<.0001
GARCH1	1	0.7357	0.0454	16.21	<.0001

Table 6: The statistics of GARCH Estimate Data Telekomunikasi Indonesia Tbk, Adhi KaryaTbk, and Astra Agro Lestari Tbk

Statistics	GARCH Estimate Data Telekomunikasi Indonesia Tbk (Model AR(1)-GARCH(1,1))	GARCH Estimate Data AdhiKaryaTbk (Model AR(1)-GARCH(1,1))	GARCH Estimate Data Astra Agro Lestari Tbk (Model AR(1)-GARCH(1,1))
Observations	777.00	777.00	777.00
SSE	1872430.39	2909418.23	179146533.00
MSE	2544	3744.00	230562.00
LogLikelihood	-3883.39	-4296.20	-5871.19
SBC	7812.99	8625.68	11775.68
AIC	7780.78	8602.41	11752.39
AICC	7780.94	8602.48	11752.48
HQC	7793.21	8611.36	11761.35
MAE	35.85	42.28	338.00
MAPE	**1.16**	**1.79**	**1.73**
UncondVar	2579.56	3758.53	235105.65
R-Square	0.99	0.97	0.98
Normality Test	110.82	876.25	104.00
p-value	<0.0001	<0.0001	<0.0001

Table 8: The Parameter Estimates model AR(1)-GARCH(1,1) data Adhi Karya Tbk

Variable	DF	Estimate	Standard Error	t-value	p-value
Intercept	1	1344.0000	1301.0000	1.03	0.3016
AR1	1	-0.9984	0.0024	-408.18	<0.0001
ARCH0	1	145.0911	105.7665	1.37	0.1701
ARCH1	1	0.0161	0.0092	1.74	0.0812
GARCH1	1	0.9453	0.0357	26.48	<0.0001

The graph of the conditional variance for data of Telekomunikasi Indonesia Tbk is given in Figure 4 along with the forecast conditional variances. The graph shows that the conditional variance is varying over time (date).

From the analyzed results of data for Adhi Karya Tbk by using AR(1)-GARCH(1,1) model the estimation of mean model (AR1) and variance model GARCH(1,1) are presented in Table 8. Based on the results of analysis given in Table 8, the estimation model AR(1)-GARCH(1,1) is shown as follows: The mean model AR(1):

$$x_t = 1344 - 0.9984\, x_{t-1} + \varepsilon_t$$

and the variance model GARCH(1,1):

$$\sigma_t^2 = 145.0911 + 0.0161\varepsilon_{t-1}^2 + 0.9453\,\sigma_{t-1}^2$$

Where x_t is the share price data for Adhi Karya Tbk at time t.

The graph of the conditional variance for the data of Adhi Karya Tbk is given in Figure 5 along with the forecast conditional variances. The graph shows that the conditional variance is varying over time (date).

From the analyzed results of data for Astra Agro Lestari Tbk by using AR (1)-GARCH (1,1) model the estimation of mean model (AR1) and variance model GARCH (1,1) are presented in Table 9. Based on the results given in Table 9, the estimation model AR(1)-GARCH (1,1) is presented as follows:

The mean model AR(1):

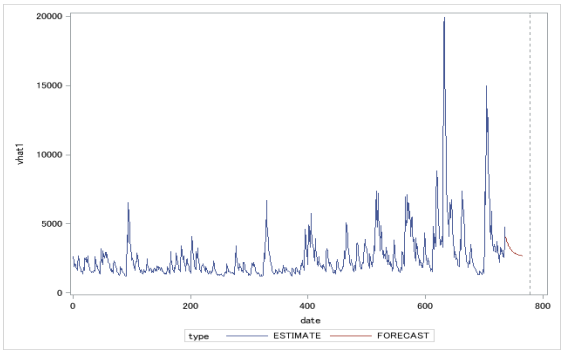


Figure 4: The conditional variance (volatility) AR(1)-GARCH(1,1) model data of Telekomunikasi Indonesia Tbk

$$x_t = 23823 - 0.9976\, x_{t-1} + \varepsilon_t$$

and the variance model GARCH(1,1):

$$\sigma_t^2 = 3810 + 0.0498\,\varepsilon_{t-1}^2 + 0.9340\,\sigma_{t-1}^2$$

where x_t is the share price data of Astra Agro Lestari Tbk at time t.

The graph of the conditional variance for data Astra Agro Lestari Tbk is given in Figure 6 along with the forecast conditional variances. The graph shows that the conditional variance is varying over time (date).

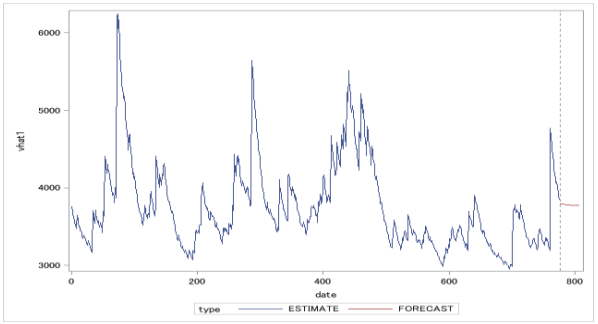


Figure 5: The conditional variance (volatility) of AR(1)-GARCH(1,1) model applied on the data of Adhi Karya Tbk

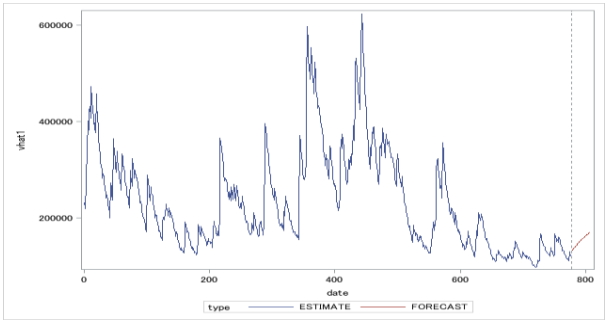


Figure 6: The conditional variance (volatility) of AR(1)-GARCH(1,1) model for the data of Astra Agro Lestari Tbk

Table 9: The Parameter Estimates model AR(1)-GARCH (1,1) data of Astra Agro Lestari Tbk

Variable	DF	Estimate	Standard Error	t-value	p-value
Intercept	1	23823.0000	2265.0000	10.52	<0.0001
AR1	1	-0.9976	0.0028	-352.40	<0.0001
ARCH0	1	3810.0000	1700.0000	2.24	0.0250
ARCH1	1	0.0498	0.0097	5.11	<0.0001
GARCH1	1	0.9340	0.0129	72.55	<0.0001

3.2 Indication of window dressing additional information from market condition.

Beside the GARCH model from each company selected in this research, the price fluctuations and variances also show the condition of window dressing.

From the average share price of Telekomunikasi Indonesia Tbk in three years from 2014 to 2016, it seems based on the table that the average share price was 2541 in 2014, 2846 in 2015, and 3795 in 2016. As the relative share price growth toward the average share price of 2014 indicates that January to June the average share prices were below the average share price of 2014, but from July to December the average share prices were above the average share price of 2014. In 2014, the average share prices in September, October, and December were boosted up to 11.1%, 10.4%, and 11.1% above the average share price of 2014, while the minimum share price was on January with the average share price of -14.1%, below the average share price of 2014. In December, the average share price was 11.1% as above the average share price of 2014; this indicates that there is a high probability of Window Dressing in the end of the year of 2014. The t-test (Table 11) shows that the average of the share price in December 2014 was very significant as above the average of the year (p-value<0.0001).

Table 10: Window Dressing Measurement from data of Telekomunikasi Indonesia Tbk, Adhi Karya Tbk, and Astra Agro Lestari Tbk

Companies	Year	Average of The Share Price of the Year	(%) deviation of the mean share price of months with respect to the average (mean) of the year for the three Companies.											
			Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Telekomunikasi Indonesia,Tbk	2014	2541	-14.1	-9.7	-12.2	-9.2	-4.3	-2.8	2.4	6.8	11.1	10.4	8.1	11.1
	2015	2846	0.1	1.4	2.6	-1.2	-0.7	0.8	1.2	0.2	-4.5	-4.4	-1.9	6.7
	2016	3795	-16.4	-12.8	-11.2	-25.2	-3.21	1.1	9.9	12	10.3	11.3	5.3	1.6
Adhi KaryaTbk.	2014	2459	-40.3	-25.7	-0.2	10.2	14.3	4.5	11.8	12.6	7.3	-3.4	-4.7	10.6
	2015	2383	32.7	30.3	19.2	12.3	2.9	-17.9	-6.3	-22.2	-21.5	-11.5	-6.1	-9.7
	2016	2493	-5.9	3.4	6.0	9.9	0.3	7.7	11.3	10.9	1.6	-6.7	-17.9	-18.3
Astra Agro Lestari Tbk	2014	23739	-11.1	-7.8	1.15	9.4	14.0	9.3	7.4	5.6	-2.8	-14.6	-4.5	-5.9
	2015	20586	13.6	9.2	17.2	8.7	12.0	8.7	11.7	-15.2	-19.9	-9.9	-12.3	-23.2
	2016	15596	1.2	2.5	2.9	0.9	-7.6	-5.4	-5.7	2.1	1.7	-2.0	-0.2	9.5

Table 11: Testing the presence of Window Dressing by t-test

Companies	Year	Average Year	Average December	(%) deviation of Average on December with respect to Average of the year	t-test	p-value
Telekomunikasi Indonesia Tbk	2014	2541	2823	11.1	32.00	<0.0001
	2015	2846	3036	6.7	12.47	<0.0001
	2016	3795	3856	1.6	3.28	0.0040
Adhi Karya Tbk	2014	2459	2716	10.6	7.46	<0.0001
	2015	2383	2235	-9.7	-27.18	<0.0001
	2016	2493	2036	-18.3	-21.38	<0.0001
Astra Agro Lestari Tbk	2014	23739	22299	-5.9	-13.16	<0.0001
	2015	20586	15759	-23.2	-28.22	<0.0001
	2016	15596	17081	9.5	16.53	<0.0001

From the relative share price growth towards the average share price of 2015, from January to March, June to August, and December show that the average share price were between 0.1% to 6.7% above the average share price in 2015. But in April to May and September to November, the average share prices were below the average share price in 2015 which was between -4.5% and -0.7%. The highest average share price in 2015 was on December as 6.7% above the average share price in 2015, while the lowest average share price found in September which was -4.5% below the average share price of 2015. The December average share price showed the increase of 6.7% than the average share price of 2015 and this could indicate that the probability of window dressing is high. According to the t-test (Table 11), the average of the share price of December 2015 was very significant and above the average of the year (p-value <0.0001). From the relative share price growth toward the average share price in 2016, from January to May indicates that the average share prices were below of the average share price in 2016, which was from -3.21% to -25.2%. Perhaps, from June to December, the average share prices were above the average share price in 2016 which was between 1.1% and 11.3%. The highest average share price on this year was in October with the average of 11.3% above the average share price, while the lowest average share price was in January as -25.2% below the average share price in 2016. December shows that the average share price was 1.6% above the average share price in 2016 which was interesting and by the percentage it shows that there was small probability of window dressing because the share price movement was consistently increasing from June to December. From the t-test (Table 11), the average of the share price of December 2016 was very significant and above the average of the year (p-value=0.0040). From the data of Adhi Karya Tbk share prices in three years from 2014-2016, the share price was 2459 in 2014, 2383 in 2015, and 2493 in 2016. It shows that the share prices of Adhi Karya Tbk in three years were stable. The relative share price growth was towards the average share price of 2014. For January to March, October, and November the average share prices were below the average share price of 2014, while in April to September and December the share price was above the average share price of 2014. The highest average share price in 2014 was on May as 14.3% above of the average share price of the year, where the lowest average share price was on January as -40.3%. In December, the average share price was above the average share price of 2014 which was 10.6%, this indicates a high probability of window dressing that raised at the end of the year. From the t-test (Table 11), the average of the share price of December 2014 was very significant and above the average of the year (p-value<0.0001). From the relative share price growth toward the average share price in 2015, the table shows that from January to May, the average share price was above the average share price of 2015 which was in between 2.9% and 32.8%. Meanwhile, in June to December the average share price was below the average share price of 2015 which was in between -6.1% and -22.2%. The highest average share price in 2015 was in January with 32.8% above the average share price of the year, while the lowest average share price was in August which was -22.2% below the average share price of 2015. In December the average share price was below the average share price of 2015 as -9.7%. This could indicate that there was small probability of window dressing in the year-end of 2015. From the t-test (Table 11), the average of the share price in December 2015 was very significant and below the average of the year (p-value<0.0001). From the relative share price growth towards the average share price of 2016, in January, November, and December the average share price was below the average share price of is the year in between -5.9% and -17.9%. But, from February to October the share price went beyond the average share price of 2016 which was in between 0.3% and 11.3%. the highest average share price in 2016 was in August as 11.3% above the average share price of the year, while the lowest was in December as -17.9% below the average share price. This indicates that there was a small probability of window dressing in the year-end of 2016 for Adhi Karya Tbk. From the t-test (Table 11),

the average of the share price of December 2016 was very significant and below the average of the year (p-value<0.0001).

For the average share prices of Astra Agro Lestari Tbk in the last three years 2014-2016, the table shows that the average share prices were decreasing, In 2014, it showed that the average share prices were 23,739 in 2014, 20.586 in 2015, and 15.596 in 2016. For the relative share price growth towards the average share price in 2014, in January, February, and from October to December, the share price was below the average of 2014, and it went beyond the average share price of 2014 from March to August. In 2014, the highest share price was shown in May as 14% beyond the average share price, while the minimum average share price was in October as below 14.6% from the average share price of the year. In December it showed that the share price was below the average share price of 2014 (-5.9%), this indicates that there was no window dressing at the year-end of 2014. From the t-test (Table 11), the average of the share price of December 2014 was very significant and below the average of the year (p-value<0.0001). From the growth of relative share price towards the average share price in 2015, from January to July it seems that the share price was above the average share price of the year, which was in between 8.7% and 13.6%. On the other hand, from August to December the share price was below the average share price of 2015 from -9.9% to -23.2%. The December share price was below the average share price of 2015 which indicates that there was no window dressing for the year-end of 2015. From the t-test (Table 11), the average share price of December 2015 was very significant and below the average of the year (p-value<0.0001). From the growth of relative share price towards the average share price in 2016, from January to April and August to September it shows that the share price was above the average share price of 2016 in between 0.9% and 2.9%. Meanwhile, from May to July and October to November the share price was below the average share price of 2016 in between -7.6% and -0.2%. In December the share price went beyond the average share price of 2016 as 9.5% and indicates that there was a possibility of window dressing at the year-end of 2016. From the t-test (Table 11), the average of the share price in December 2016 was very significant and above the average of the year (p-value<0.0001).

Figure 7 shows the data share price of Telekomunikasi Indonesia Tbk, where the (%) deviation of the average price of months with respect to the mean of the share price of the year 2016 is higher compare to the (%) deviation in 2014 and 2015, and this is consistent with the result in Figure 4. For the data share price of Adhi Karya Tbk, the (%) deviation of the average price of months with respect to the mean of the share price of the year in 2014 and 2015 were higher than 2016 which was consistent with the result in Figure 5. For the data share price of Astra Agro Lestari Tbk, the (%) deviation of the average price of months with respect to the mean of the share price of the year 2015 was higher than 2014 and 2016 which was consistent with the result presented in Figure 6. This indicates that the volatility of the price of Telekomunikasi Indonesia Tbk were very high in 2016; the volatility of the share price of Adhi Karya Tbk were high in 2014 and 2015; and volatility of share price of Astra Agro Lestari Tbk was also high in 2015.

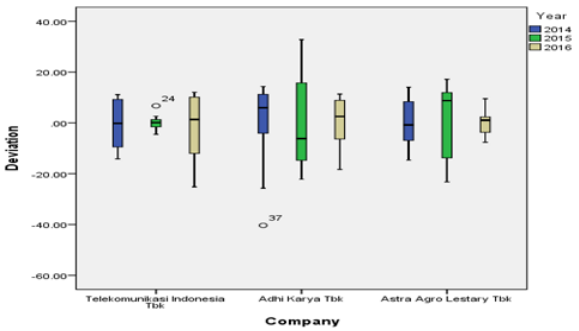


Figure 7: (%)deviation of the mean share price of months with respect to the Average (mean) of the year for the three Companies.

4 Conclusion

Analysis based on time series modeling to see the behavior of variance (volatility) and share price movement of data for Telekomunikasi Indonesia Tbk, Adhi Karya Tbk, and Astra Agro Lestari Tbk, the fit model is AR(1)-GARCH(1,1). By using this model, the behavior of variances (volatility) can be explored. For the data of Telekomunikasi Indonesia Tbk, higher volatility occurs in 2014 and 2016 compared to 2015. When the volatility is high, the share price movements are very fluctuating which can be seen in 2014 and 2016, while in 2015 the share price movements were relatively stable. For the data of Adhi Karya Tbk, higher volatility were observed in 2014 and 2015 compared to 2016. When the volatility is high, the share price movements are very fluctuating as reflected in 2014 and 2015, while in 2016 the share price movements were relatively stable. For the data of Astra Agro Lestari Tbk, higher volatility occurred in 2014 and 2015 compared to 2016. For the high volatility of data, the share price movements showed very fluctuation in 2014 and 2015, while in 2016 the share price movements were relatively stable.

From the analysis of Window Dressing at the end of the year (month of December), it is found that window dressing for Telekomunikasi Indonesia Tbk occurred in December 2014, 2015, and 2016, and the average price of December were above the average of the year. From the t-test analysis, it is found that the tests are

very significant with p-values<0.0001 in 2014 and 2015, and p-values=0.0040 in 2016. Window dressing for Data Adhi Karya Tbk occurred in December 2014 and the average price of December were above the average of the year. T-test analysis shows that the test is very significant with p-values<0.0001 in 2014. Data analysis for Astra Agro Lestari Tbk shows that the window dressing was occurred in December 2016 where the average price of December were above the average of the year. The t-test shows that the test is very significant with p-values<0.0001 in 2016. But window dressing may occur either in high volatility or in low volatility. From the above analysis it is found that the window dressing for Telekomunikasi Indonesia Tbk in 2014 and 2016 and for Adhi Karya Tbk in 2014 were at high volatility. On the other hand, low volatility were found for the window dressing of Telekomunikasi Indonesia Tbk in 2015 and for the window dressing of Astra Agro Tbk in 2016.

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