Day-of-The-Week Anomaly on Different Stock Capitalization: Evidence from Indonesian Stock Market

Dadang Wahyu Juniarwoko[1*], Tony Irawan[2], Lukytawati Anggraeni[3]

[1] Bogor Agricultural University, Bogor, Indonesia
[2,3] Bogor Agricultural University, Bogor, Indonesia

Abstract

The aim of this study is to determine whether the "Day-of-The-Week Anomaly" (DOWA) exists on different stock capitalization in Indonesian stock market. A total of 58 stocks listed in both LQ45 index and Pefindo25 index used to represent large cap stocks and small and medium cap stocks respectively. The Ordinary Least Squares (OLS) method and ARCH/GARCH model were employed to capture the DOWA and the daily volatility behavior for the period between January 2010 and December 2015. The result reveals that DOWA exist for a significant proportion of individual stocks in both LQ45 and Pefindo25. Monday was found to have the lowest mean returns while Wednesday has the highest mean return. The differences between Monday's return and return of the other days ranged from 0.15 to 0.41 percent. LQ45 stocks also found to have slightly higher Wednesday's volatility than of Pefindo25 stocks. It indicates that the higher return of the LQ45 is naturally accompanied by a higher risk.

JEL Classification: G02, G10, G17
Keywords: *Day-of-The-Week Anomaly, Indonesia, LQ45, Pefindo25, Stock Market*

1. INTRODUCTION

Calendar anomaly defined as the presence of recurring patterns that occur at certain calendar points, e.g. certain month or day, which provides opportunities for investors to earn abnormal returns (Deyshappriya, 2014). Calendar anomaly has been found to exist in the various stock markets in many countries, not least in the developed countries like USA, Japan, UK, France, Austria, Belgium, Canada, Denmark, Germany, Ireland, Italy, The Netherlands, Norway, Singapore, and Spain (Dicle and Levendis, 2012; Das and Rao, 2011; Bouman and Jacobsen, 2002). However, anomalies were found in most of these countries have been weakened (Dicle and Levendis, 2012). Therefore recent studies of calendar anomalies tend to be done in developing countries (Cifuentes and Cordoba, 2013). Studies on developing countries are more likely to produce findings about the calendar anomaly (Singh, 2014; Mouselli and Al-Samman, 2016; Deyshappriya, 2014; Alrabadi and Al-Qudah, 2012; Brahmana, Hooy, and Ahmad, 2011; Angelovska, 2014). Indonesia, which is also a developing country, has also become the object of study of calendar anomalies in the previous literature. Indonesian capital market referred to as a semi-strong efficient market (Husnan, 1998),

* Corresponding author. *Email address*: dadangwahyujuniarwoko@yahoo.co.id

meaning that investors cannot predict stock prices based on patterns of historical prices and public information, however this finding were contradicted by other studies that found some seasonal anomalies in Indonesia, such as the month of the year anomaly (MOYA) and the day of the weak anomaly (DOWA) (Anwar and Mulyadi, 2012; Iramani and Mahdi, 2006; Werastuti, 2012; Naughton and Veeraghavan, 2005). These studies indicate that Indonesian stock market is still inefficient, meaning that investors can predict stock prices based on stock price movement patterns of the past.

Indication of calendar anomaly in Indonesian stock market can be seen from daily return of LQ45 and Pefindo25 indices. Both on the LQ45 and Pefindo25 indices, the highest average return are seems to be on Wednesday. Wednesday of LQ45 index has an average return of 0.01 to 0.32 percent higher than the other day, while in the Pefindo25 index the differences range from 0.16 to 0.38 percent (Figure 1 and Figure 2). LQ45 used in this study to represent the "behavior" of large capitalization stocks. Whereas Pefindo25 Index is an index comprised of Small and Medium Enterprises (SME) listed companies with at least five trillion rupiah assets, it used to represent the "behavior" of small and medium cap stocks. Anomaly indications need to be seen in different stock capitalization as market, especially risk lover investors, usually prefers to trade on second line stocks because these stocks often offer higher returns than large-cap stocks, but of course with a greater risk (Switzer, 2012). The second line stocks are often reported in the media as an first alternative when the movements of LQ45 stocks are stagnant (Prasetyo, 2016). If a different pattern of anomaly is found in different stocks capitalization then an anomaly based trading strategy can be applied for each type of capitalization.

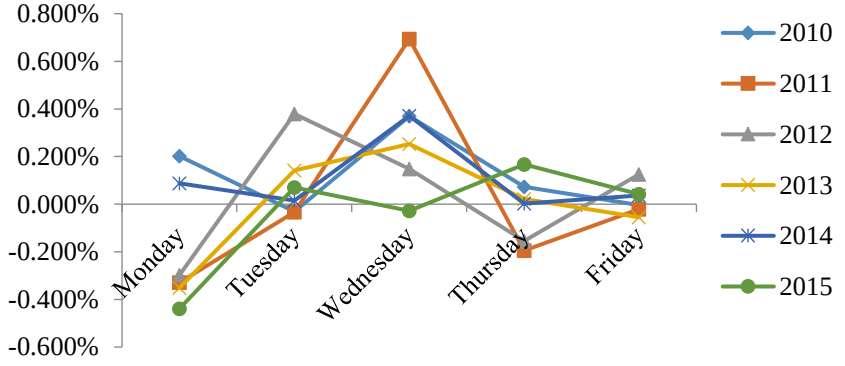

Figure 1 Daily mean return of LQ45 2010-2015
Source: Yahoo Finance (Processed)

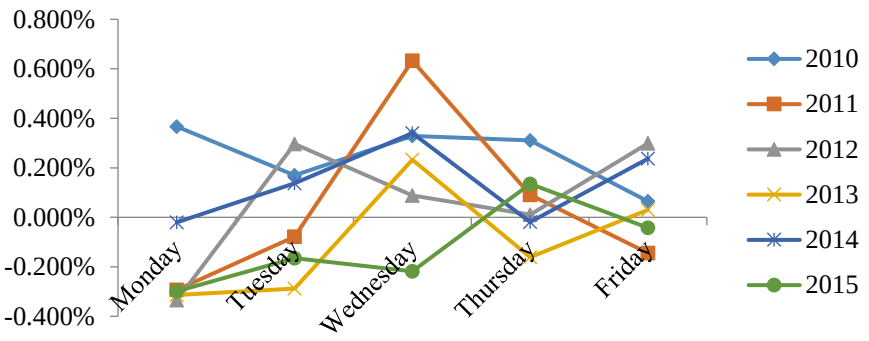

Figure 2 Daily mean return of Pefindo25 2010-2015
Source: Yahoo Finance (Processed)

While calendar anomaly is quite often researched before, but previous studies on calendar anomaly only examine the index, however, the anomaly that occurs at the index level does not necessarily occur in each of its constituent stocks, or vice versa. This point of view has been proven by Dicle and Levendis (2012), according to what we learn so far they are the first to prove the idea, in their research about calendar anomaly in several developed markets. They found that even tough there was no anomaly found on some indices, but the the anomaly was still exist on at least 7 percent of its constituent stocks. This study, in the same manner, aims to determine how many constituent stocks of an index that also have the same anomaly as their index.

The other main idea of this study is that there is a theory regarding calendar anomaly which states that the anomaly occurs mostly in small cap stocks (Mangala and Lohia, 2013). Analysis at the group of stocks with different market capitalization is usually carried out to clarify the theory. This is also reason for this study to use two indices with different capitalization. This study intends to accommodate these two ideas and answer them in one paper, not as separate as the previous research.

2. LITERATURE REVIEW

There are many types of calendar anomalies that have been found since long, Day-of-The-Week Anomaly (DOWA) which also known as Monday Effect, such as Halloween effect or Sell in May Indicator, Turn-of-The-Month effect and Rogalski effect. DOWA or Monday effect is a low return pattern that is usually found only on Monday. Monday effects are suspected to occur because of the behavior of individual investors who usually collect and process information outside of trading times, such as weekends. The lack of analytical reports that support investors to take long positions makes returns on Monday tend to be lower than other days. In addition, certain corporate habits to release bad news on weekends make investors more pessimistic in trading on Monday (Dicle and Levendis, 2012).

Studies of calendar anomaly in developed countries produce diverse conclusions, but most researches lead to the conclusion of the disappearance of the anomaly or at least the effects of the anomaly is further weakened. According to Dicle and Levendis (2012), in the United States, Japan and the United Kingdom stock markets, DOWA are no longer exist at the market level, but it still exist at the individual stocks level. They found that at least seven percent of the total number of stocks in each market still has DOWA. Unlike the case in developed countries, researches of calendar anomaly in developing countries tend produced more findings. Alrabadi and Al-Qudah (2012) found on the ASE index of Amman, Monday has the lowest significant negative return compared to other days. DOWA is also found in Indonesia, Singapore, Malaysia (Deyshappriya, 2014; Iramani and Mahdi, 2006).

According to Bodie, Kane, and Marcus (2008) calendar anomalies are more likely to occur in small cap stocks than big cap stocks. This phenomena is related to another anomaly called the size effect, the size effect happens when small cap stocks have a higher rate of return than of the big cap stocks (Battman, Ng, dan Sault 2010). Bodie, Kane, and Marcus (2014) stated the size effect usually occurs on January and known by Small-Firms-in-January-effect. Small Firms in January Effect occurs in some developed countries, as found by Bettman, Ng, and Sault (2011) in Australia, and Brockman and Michayluk (1997) in the United States. However, using the small-cap special indices for the US market, Dhatt, Kim, and Mukherji (1999), instead found that small cap effects actually occurred in months other than in January Size effects are also found in DOWA, Brahmana, Hooy, and Ahmad (2011, found Monday Effect occurs only in low cap and mid cap stock.

Hypothesis

The hypotheses of this research are stated as follows:

1. There is a significant difference in daily return between different days of the week.
2. There is a significant difference in monthly returns between different months of the year.

3. DATA AND METHODOLOGY

The data used in this study are daily closing prices of stocks and indices. The observation period of this study is from the date of the end of December 2009 until the end of December 2015. Data was obtained from Yahoo Finance and Google Finance. Stocks that observed are the ones that remain listed or at least frequently listed on Pefindo25 and LQ45 during 2010-2015. A total of 58 stocks met the criteria.

The return is calculated using this following equation:

$$RT_t = Ln\left(\frac{Pr_t}{Pr_{t-1}}\right) \quad (1)$$

Where:

RT_t : return in period *t*,
Ln : natural logarithm,
Pr_t : close price of stocks or index in period *t*,

Pr_{t-1} : close price of stocks or index in period *t*-1.

Based on Shiller and Radikoko (2014), natural logarithm is utilized so that the return values are more likely to be distributed normally and to dismiss parts of linear dependency between the current and the past return.

To examine the existence of DOWA in stock returns, the following equation is used:

$$R_t = \beta_0 + \beta_1 D_{1t} + \beta_2 D_{2t} + \cdots + \beta_4 D_{4t} + \sum_{i=1}^{q} R_{t-i} + \mu_t + \sum_{i=1}^{q} \mu_{t-i} \quad (2)$$

Where R_t stands for the daily return, D_1 through D_4 are daily dummy variables. If it is Monday, then D_1= 1 and 0 for all other days, and so forth. The error terms may not be white noise due to autocorrelation and lagged values of the return variable are included. The value of the past error(s) of time t is also included in the model. Such model had been used by Angelovska (2014) in terms of the use of lagged return. While the use of past error variable has been recommended by Firdaus (2011) as one of the stages in the estimation model of ARCH / GARCH.

Coefficients β_0, β_1...β_4 represent the Wednesday effect, Monday effect...Friday effect on stock returns, respectively. If β coefficient of the respective day is positive and high it implies that the particular day exhibits abnormally high positive returns and if a β coefficient is negative and high for a particular day it implies that high negative returns are generated in that day. This model also use Wednesday as the benchmark category, because Wednesday is indicated to have the highest return both for LQ45 and Pefindo25. The indication is shown in Figure 1 and Figure 2.

This study used two alternatives of estimator for the model which are Ordinary Least Square (OLS) method and ARCH/GARCH model. Estimator used depends on the condition of the data, if the data used are heteroscedastic then the estimator that will be used is ARCH / GARCH, whereas if the data is homoscedastic then OLS will be used. In order to check the heteroscedasticity condition of serial data, the ARCH effect test is applied. Before using the OLS and ARCH/GARCH model, it is a precondition that the time series must be stationary (Mangala and Lohia 2013). To ensure the stationarity in the return series, unit root tests have been applied. This study use Augmented Dickey-Fuller (ADF) test and Phillip-Perron (PP) test for the unit root tests.

The ARCH/GARCH model have other benefits besides being able to overcome the problem of heteroskedasticity, the equation of variance of this model can be used to see the effect of the Dowa on the volatility. The variance equation of the ARCH/GARCH model is stated as follows:

$$h_t = \alpha_0 + \sum_{i=1}^{N} \alpha_i D_i + \sum_{i=1}^{q} \alpha_i e_{t-i}^2 + \sum_{i=1}^{p} \beta_i h_{t-i} \quad (3)$$

h_t is the conditional variance and α_0 to α_4 represent the size of the day of the week effect on volatility. The stationary condition for GARCH is $\alpha_i + \beta_i < 1$.

4. EMPIRICAL RESULT AND DISCUSSION

It can be inferred from Table 1 and Table 2 that return data of all stocks examined are stationary, but only a few of them are normally distributed. The normality test results are shown by Jarque Berra value. It's also seen from Table 1

and Table 2 the data of serial return are mostly not normally distributed and heteroscedastic. Only a few of them are homoscedastic.

Table 1 Results of Jarque Berra test, ADF test, PP test, and ARCH effect test of LQ45 stock members return

Stocks	Std. Dev.	Skewness	Kurtosis	Jarque Berra	JB Prob.	ADF Prob.	PP Prob.	ARCH Effect Prob.
AALI	2.389	0.352	0.352	606.917	0.000	0.000	0.000	0.000
ADRO	2.758	0.326	6.745	884.026	0.000	0.000	0.000	0.001
ANTM	2.464	0.786	13.032	6306.647	0.000	0.000	0.000	0.014
ASII	2.157	0.091	5.192	295.887	0.000	0.000	0.000	0.000
BBCA	1.856	-0.034	5.777	472.089	0.000	0.000	0.000	0.000
BBNI	2.172	-0.088	7.191	1075.469	0.000	0.000	0.000	0.000
BBRI	2.236	0.041	6.177	617.930	0.000	0.000	0.000	0.000
BDMN	2.545	1.426	24.640	29121.900	0.000	0.000	0.000	0.213
BMRI	2.197	-0.073	6.561	776.741	0.000	0.000	0.000	0.000
GGRM	2.140	0.300	5.598	458.525	0.000	0.000	0.000	0.000
INCO	2.870	0.383	5.875	541.552	0.000	0.000	0.000	0.000
INDF	2.072	-0.178	7.012	992.266	0.000	0.000	0.000	0.000
INTP	2.396	-0.069	6.907	934.627	0.000	0.000	0.000	0.000
ITMG	2.467	-0.085	5.116	275.697	0.000	0.000	0.000	0.037
JSMR	1.869	0.038	7.215	1087.218	0.000	0.000	0.000	0.000
KLBF	2.207	-0.156	8.772	2044.084	0.000	0.000	0.000	0.000
LPKR	2.499	-0.300	8.137	1636.340	0.000	0.000	0.000	0.247
LSIP	2.562	0.339	6.876	946.998	0.000	0.000	0.000	0.605
PGAS	2.241	-0.311	7.139	1071.350	0.000	0.000	0.000	0.000
PTBA	2.453	0.172	6.200	633.453	0.000	0.000	0.000	0.000
SMCB	2.295	-0.387	6.766	904.077	0.000	0.000	0.000	0.000
SMGR	2.245	0.181	7.232	1103.790	0.000	0.000	0.000	0.000
TINS	2.584	0.472	6.219	688.331	0.000	0.000	0.000	0.000
TLKM	1.789	-0.122	4.550	150.528	0.000	0.000	0.000	0.000
UNTR	2.407	-0.004	5.065	260.747	0.000	0.000	0.000	0.000
UNVR	2.123	0.243	7.363	1178.537	0.000	0.000	0.000	0.000
ASRI	3.056	0.222	6.555	785.109	0.000	0.000	0.000	0.000
BBTN	2.514	0.079	8.297	1717.428	0.000	0.000	0.000	0.000
BMTR	3.171	1.312	11.151	4484.865	0.000	0.000	0.000	0.000
BSDE	2.889	-0.310	9.044	2258.033	0.000	0.000	0.000	0.021
CPIN	3.083	0.003	7.393	1180.550	0.000	0.000	0.000	0.000
EXCL	2.912	0.149	10.227	3200.139	0.000	0.000	0.000	0.000
ICBP	2.045	0.235	5.125	304.896	0.000	0.000	0.000	0.000
AKRA	2.386	-0.046	4.790	196.563	0.000	0.000	0.000	0.000
MNCN	3.176	0.980	8.317	1964.187	0.000	0.000	0.000	0.000

Table 2 Results of Jarque Berra test, ADF test, PP test, and ARCH effect test of Pefindo25 stock members return

Stocks	Std. Dev.	Skewness	Kurtosis	Jarque Berra	JB Prob.	ADF Prob.	PP Prob.	ARCH Effect Prob.
ACES	2.835	0.445	5.951	580.833	0.000	0.000	0.000	0.000
ARNA	3.402	0.003	10.958	387.393	0.000	0.000	0.000	0.000
AISA	2.947	0.801	7.732	1,525.362	0.000	0.000	0.000	0.000
AMAG	2.956	0.459	11.826	4,815.887	0.000	0.000	0.000	0.000
ASGR	2.596	1.027	10.908	4,083.112	0.000	0.000	0.000	0.000
BISI	3.180	1.119	10.461	3,710.821	0.000	0.000	0.000	0.000
CMNP	2.864	1.747	16.846	12,473.880	0.000	0.000	0.000	0.000
ELSA	2.714	1.094	9.236	2,671.341	0.000	0.000	0.000	0.000
GZCO	2.647	1.003	11.136	4,294.615	0.000	0.000	0.000	0.002
INTA	2.422	1.601	16.076	11,085.240	0.000	0.000	0.000	0.008
LPCK	3.718	0.812	9.948	3,099.291	0.000	0.000	0.000	0.000
MAIN	3.716	0.235	14.523	7,864.070	0.000	0.000	0.000	0.000

Stocks	Std. Dev.	Skewness	Kurtosis	Jarque Berra	JB Prob.	ADF Prob.	PP Prob.	ARCH Effect Prob.
NIKL	2.564	0.720	10.637	3,694.173	0.000	0.000	0.000	0.000
PBRX	3.561	1.483	18.062	14,374.880	0.000	0.000	0.000	0.000
RALS	2.743	0.346	5.808	511.719	0.000	0.000	0.000	0.000
SGRO	0.203	0.090	6.120	597.415	0.000	0.000	0.000	0.002
SMSM	2.421	0.523	10.288	3,315.891	0.000	0.000	0.000	0.000
SSIA	3.847	0.526	7.683	1,409.406	0.000	0.000	0.000	0.000
TBLA	2.215	0.334	7.072	1,041.486	0.000	0.000	0.000	0.000
TOTL	3.233	0.825	9.854	3,040.374	0.000	0.000	0.000	0.000
BWPT	3.250	-0.436	16.815	11,672.300	0.000	0.000	0.000	0.000
KREN	2.246	1.307	14.310	7,966.375	0.000	0.000	0.000	0.000
MAPI	2.889	0.578	6.322	756.306	0.000	0.000	0.000	0.000

The results of several tests shown in Table 1 and Table 2 are used to determine which method used to estimate the mean equation that stated earlier. For those stocks which their return have heteroscedasticity problem, ARCH/GARCH model will be utilized to estimates their mean equations. Otherwise, for the stocks that do not have heteroscedasticity problem OLS method will be used to estimates their mean equations.

Empirical Results and Discussion

Before discussing about the existence of DOWA on individual stocks, we first need to see if DOWA exist at market level. In LQ45, DOWA occurs with patterns that Monday has the significantly lowest return and Wednesday has the significantly highest return. The detailed result can be seen in the following regression outcomes:

r_t: 0.278C -0.410Monday -0.145Tuesday -0.311Thursday -0.179Friday R^2=0.031
(0.059) (0.094) (0.088) (0.083) (0.097)
+1.084Y_{t-1} -0.444Y_{t-2} +μ_t -1.059μ_{t-1} +0.324μ_{t-2}
(0.182) (0.155) (0.193) (0.175)

σ^2_t: 0.083C +0.119Monday -0.291Tuesday -0.139Thursday +0.329Friday
(0.081) (0.135) (0.140) (0.129) (0.129)
+0.152 ε^2_{t-1} +0.809h_{t-1}
(0.152) (0.809)

The difference between Wednesday's mean return and any other days' return is about 0.15 to 0.41 percent. The same pattern was found in the index Pefindo25, where Monday and Wednesday are the days with anomalies. The regression outcomes of Pefindo25 are as follows:

r_t: 0.240C -0.320Monday -0.146Tuesday -0.161Thursday -0.147Friday R^2=0.020
(0.068) (0.094) (0.095) (0.098) (0.098)
+0.848Y_{t-1} -0.907Y_{t-2} +μ_t -0.842μ_{t-1} +0.944μ_{t-2}
(0.029) (0.034) (0.024) (0.026)

σ^2_t: 0.058C +0.298Monday -0.123Tuesday -0.185Thursday +0.092Friday
(0.119) (0.166) (0.196) (0.189) (0.145)
+0.103ε^2_{t-1} +0.860h_{t-1}
(0.013) (0.016)

Comparing the Wednesday's return of LQ45 index with the Wednesday's return of Pefindo25 index, it can be concluded that the Wednesday anomaly of LQ45 produces slightly higher return than that of Pefindo25. But the risk contained on Wednesday return of LQ45 is slightly higher than the risk contained on Wednesday return of Pefindo25. It seems that even in terms of anomaly it's still following the most known norm of the relation between risk and return that is "the higher the risk the higher the return".

The next thing to be discussed after we found that DOWA exist on market level is to examine whether this phenomena reflected on the individual stocks. The results of DOWA examination in LQ45 stocks, stated in Table 3, shows that most of the stocks (74.29 percent of them) have significantly low (negative) return on Monday and significantly high (positive) return on Wednesday.

Table 3 DOWA on LQ45 stocks (estimates of mean equation and variance equation)

Stocks	ARIMA	ARCH/GARCH	Highest Return	Lowest Return	Highest Volatity	Lowest Volatility
AALI	(1,0,0)	(1,2)	Friday**	Monday**	Monday**	Friday**
ADRO	(1,0,1)	(1,1)	Wednesday**	Monday**	Wednesday**	Tuesday**
ANTM	(2,0,2)	(1,1)	Monday**	Friday**	Wednesday**	Monday**
ASII	(2,0,1)	(1,1)	Wednesday**	Thursday**	Wednesday**	Tuesday**
BBCA	(1,0,1)	(1,2)	Wednesday**	Monday	Friday**	Tuesday**
BBNI	(2,0,2)	(3,0)	Wednesday**	Monday**	Friday**	Wednesday**
BBRI	(2,0,2)	(1,2)	Wednesday**	Monday**	Friday**	Tuesday**
BDMN	(1,0,1)	-	Wednesday	Monday**	-	-
BMRI	(2,0,2)	(1,1)	Wednesday**	Monday**	Friday**	Tuesday**
GGRM	(2,0,3)	(1,1)	Wednesday*	Thursday**	Wednesday**	Thursday**
INCO	(2,0,2)	(1,1)	Wednesday	Tuesday*	Wednesday**	Thursday**
INDF	(2,0,2)	(1,1)	Wednesday**	Monday**	Wednesday*	Thursday**
INTP	(2,0,2)	(1,1)	Wednesday*	Monday**	Friday*	Tuesday**
ITMG	(2,0,2)	(1,1)	Thursday**	Monday**	Monday	Tuesday**
JSMR	(2,0,2)	(1,2)	Wednesday**	Monday**	Monday*	Thursday*
KLBF	(1,0,1)	(1,1)	Wednesday*	Monday	Wednesday**	Tuesday**
LPKR	(1,0,3)	(1,1)	Wednesday	Monday*	Monday*	Tuesday**
LSIP	(2,0,2)	(1,0)	Wednesday	Monday**	Thursday**	Wednesday**
PGAS	(3,0,2)	(1,2)	Wednesday**	Monday**	Wednesday*	Monday*
PTBA	(3,0,3)	(2,0)	Wednesday	Monday**	Tuesday*	Wednesday**
SMCB	(2,0,3)	(1,1)	Wednesday**	Monday**	Friday**	Thursday**
SMGR	(2,0,2)	(1,2)	Wednesday**	Monday**	Monday**	Tuesday**
TINS	(2,0,2)	(1,1)	Wednesday*	Monday**	Thursday**	Tuesday
TLKM	(2,0,2)	(1,2)	Wednesday**	Monday**	Friday**	Thursday*
UNTR	(2,0,2)	(1,1)	Wednesday**	Monday**	Wednesday**	Friday**
UNVR	(1,0,1)	(2,0)	Wednesday**	Monday**	Tuesday*	Monday*
ASRI	(2,0,3)	(1,2)	Wednesday**	Monday**	Thursday**	Tuesday
BBTN	(2,0,2)	(1,2)	Wednesday**	Monday**	Thursday**	Tuesday**
BMTR	(2,0,2)	(3,0)	Wednesday**	Monday**	Tuesday**	Friday**
BSDE	(1,0,1)	(1,2)	Wednesday**	Monday**	Thursday**	Tuesday
CPIN	(3,0,0)	(1,2)	Wednesday**	Monday**	Friday**	Thursday**
EXCL	(2,0,3)	(1,2)	Thursday	Monday**	Wednesday**	Tuesday
ICBP	(1,0,1)	(1,2)	Wednesday*	Monday**	Wednesday**	Thursday**
AKRA	(2,0,2)	(1,0)	Wednesday**	Thursday**	Wednesday**	Tuesday
MNCN	(1,0,2)	(2,0)	Wednesday**	Monday**	Wednesday**	Thursday**

Note: * and ** indicate significance at 10 percent and 5 percent respectively

As for the examination of DOWA on Pefindo25 stocks, the results are quite similar with the result of LQ45 stocks. The pattern of Monday and Wednesday is

still dominating the results, but the stocks that experienced it are in the lower proportion, only about 47.38 percent of them share the same pattern as LQ45 stocks. The results are shown in Table 4.

Table 4 DOWA on Pefindo25 stocks (estimates of mean equation and variance equation)

Stocks	ARIMA	ARCH/GARCH	Highest Return	Lowest Return	Highest Volatity	Lowest Volatility
ACES	(1,0,1)	(1,1)	Friday	Monday	Wednesday**	Thursday**
ARNA	(2,0,2)	(3,0)	Friday*	Monday	Friday**	Wednesday**
AISA	(0,0,2)	(1,2)	Wednesday	Tuesday	Monday**	Friday**
AMAG	(2,0,2)	(1,1)	Thursday	Monday**	Thursday**	Friday*
ASGR	(2,0,2)	(1,1)	Wednesday	Monday	Monday*	Tuesday**
BISI	(2,0,2)	(1,1)	Wednesday	Friday**	Wednesday**	Tuesday**
CMNP	(3,0,2)	(1,2)	Tuesday	Friday*	Monday**	Wednesday
ELSA	(1,0,1)	(1,2)	Thursday*	Monday**	Thursday**	Tuesday**
GZCO	(2,0,3)	(1,3)	Thursday	Monday	Thursday**	Wednesday**
INTA	(2,0,3)	(1,1)	Wednesday**	Monday**	Wednesday**	Friday**
LPCK	(2,0,3)	(2,0)	Wednesday**	Monday**	Wednesday**	Friday**
MAIN	(2,0,2)	(1,1)	Wednesday**	Monday**	Monday**	Friday**
NIKL	(3,0,2)	(1,2)	Wednesday	Tuesday	Friday**	Wednesday**
PBRX	(2,0,2)	(1,2)	Wednesday**	Tuesday*	Monday	Friday*
RALS	(2,0,2)	(1,1)	Wednesday*	Monday**	Wednesday**	Tuesday**
SGRO	(3,0,3)	(1,0)	Wednesday**	Monday**	Wednesday**	Monday**
SMSM	(2,0,2)	(1,1)	Wednesday**	Friday*	Wednesday**	Tuesday**
SSIA	(2,0,3)	(1,0)	Wednesday**	Monday*	Thursday**	Friday**
TBLA	(3,0,2)	(1,2)	Thursday	Monday**	Wednesday**	Tuesday**
TOTL	(1,0,1)	(1,2)	Wednesday*	Friday	Monday**	Wednesday**
BWPT	(1,0,3)	(3,0)	Tuesday	Monday**	Wednesday**	Friday**
KREN	(3,0,3)	(1,1)	Wednesday**	Monday	Wednesday**	Thursday**
MAPI	(1,0,2)	(3,0)	Wednesday*	Monday**	Thursday**	Wednesday**

Note: * and ** indicate significance at 10 percent and 5 percent respectively

Based on the result of analysis of DOWA on LQ45 stocks and Pefindo25 stocks, it can be clearly stated that DOWA happened on LQ45 and Pefindo25 are also reflected on their stocks. Traditionally, a study of calendar anomaly, also add some explanation or presumption about how could the phenomena happen. Thus, this research will also try to provide its own presumption about the cause of the anomaly.

It is easier to explain the cause Monday effect that exists than to explain the cause of Wednesday effect. It because Monday effect is a long known phenomenon, and the possible explanations provided by numerous previous literatures are abundant. One of the most widely used theory to explain Monday effect is the pessimistic attitude of investors toward Monday. This behavior related explanation was based on several reasons. These reasons are: (1) individual investors usually collect and process information outside trading hours such as weekends, (2) lack of analysis reports that support the investor to buy at the weekend to make return Monday tends to be lower than other days, (3) the habit of certain companies to release bad news on the weekend made investors become more pessimistic for trading on Monday.

About the possible explanation for the Wednesday effect, we need to refer to previous literatures that study the similar phenomena on the same market. Fortunately the study of calendar anomaly on Indonesian market had been done before. Using also LQ45 index, Iramani and Mahdi (2006) also found DOWA in

Indonesian stock market. But the pattern is a bit different, they also found Monday has the lowest return, but for the day that has the highest return is Thursday. It is commonly known in DOWA case that the information that known to the market can be directly exploited and cause the pattern to move or disappear (Philpot and Peterson, 2011). So predictably, the market that has been aware of the information about DOWA before and then exploit that information, causing the patterns to move its highest return to Wednesday, as found in this study. It can be drawn from the our analysis, there is a movement up from Monday until reaching its peak in Wednesday, indicating that buying action is accumulated in Wednesday and investors hold the stocks through Tuesday and sell them at some point on Thursday. Buying action that accumulates on Wednesday was suspected to be the cause of the stock price on Wednesday to be the highest.

There is one last interesting question than can be asked form the DOWA findings, that is: Could it be exploited to produce return that can beat the market return? To answer this question we calculated a simple scenario that compares the result of holding the LQ45 or Pefindo25 portfolio throughout the year and the result of doing the active buy and sell strategy between Monday and Wednesday. The last strategy requires investors to buy stocks on Monday and sell them on Wednesday. The results are shown on Table 5.

Tabel 5 Comparison between the market return and the return of timing strategy

LQ45 (percent)				Pefindo25 (percent)			
Accumulative Market Return per Year		Return of timing strategy		Accumulative Market Return per Year		Return of timing strategy	
2010	28.31	monthly	1.64	2010	60.13	monthly	1.33
2011	1.82	Yearly	21.3	2011	5.95	Yearly	17.3
2012	8.74			2012	15.53		
2013	-3.31			2013	-27.07		
2014	23.39			2014	30.66		
2015	-14.11			2015	-32.08		
Average	7.48			Average	8.85		

It may be inferred from Table 6, if an investors execute the timing strategy, either by doing it by buying and selling LQ45 or Pefindo25 stocks, the investor will has the possibility of gaining return above the market. The yearly average returns of timing strategy both in LQ45 and Pefindo25 are exceeding the yearly return of their own market in 2011, 2012, 2013, and 2015. It means the possibility of the investor to obtain above market return by doing the timing strategy is about 66.67 percent. It also can be concluded from Table 6 that in the implementation of timing strategy, one can obtain better return if he/she use LQ45 portfolio or LQ45 ETF. Hence, we recommend LQ45 stocks or LQ45 ETF the implementation of timing strategy. To complete the recommendation we also need to look at the daily risk of each index. The daily risk is shown on Table 6.

Table 6 Daily risks of LQ45 and Pefindo25

	Variance				
	Mon	Tue	Wed	Thu	Fri
LQ45	1.163	0.753	1.044	0.905	1.373
Pefindo25	1.319	0.898	1.021	0.836	1.113

The risk of Wednesday on Pefindo25 is smaller than of LQ45, while for Tuesday risk, which is the day that also included in the timing strategy, Pefindo25 has the higher risk. When the value of the risks of Tuesday and Wednesday are summed, Pefindo25 has a greater risk. Thus, in terms of cumulative risk and cumulative return, LQ45 is the best option in the implementation of timing strategy.

5. CONCLUSION

DOWA is proved to exist both in the level of individual stocks as well as in the market level. Most of the stocks as well as the two indices investigated exhibit low return on Monday and high return on Wednesday. However, LQ45 has a larger proportion of stocks with DOWA than Pefindo25. This indicated that DOWA is more likely to be exhibited by big cap stocks, opposite to common theory that calendar anomaly is more likely to happen to small cap stocks.

The pattern that discovered is suspected to be a change from the previous DOWA pattern found by Iramani and Mahdi (2006).The comparison of risk and return of timing strategy between LQ45 and Pefindo25 resulted to conclusion that LQ45 is the better group of stock in terms of cumulative return and its cumulative of risk is below Pefindo25. Because of the fact that LQ45 is the driving force of the Indonesian stock market, it's only normal that DOWA will also be found using the Indonesian composite index.

References

Alrabadi, D. W. H., & Al-Qudah, K. A. (2012). Calendar Anomalies: The Case of Amman Stock Exchange. *International Journal of Business and Management*. 7(24), 120-127.

Angelovska, J. (2014). Month Related Seasonality on the Macedonian Stock Market. *Business and Economics Research Journal*. 5(1), 143-150.

Anwar, Y., & Mulyadi M. S. (2012). Analysis of Calendar Effects: Day-of-the-week Effects in Indonesia, Singapore, and Malaysia Stock Markets. *African Journal of Business Management*. 6(11), 3880-3887.

Bettman, J. L., Ng, W .S. K., & Sault, S. J. (2011). The Economic Significance of Trading Based on The Size Effect in Australia. *Australian Journal of Management*. 36(1), 59-73.

Bouman, S., & Jacobsen, B. (2002). The Halloween Indicator, Sell in May and Go Away. Another Puzzle. *The American Economic Review*. 92(5), 1618-1635.

Bodie, Z., Kane, A., & Marcus, A. J. (2008). *Essentials of Investment, Seventh Edition.* New York: McGraw Hill Education (Asia).

Brahmana, R. K., Hooy, C. W., & Ahmad, Z. (2011). Weather, Investor Irrationality And Day-Of-The-Week Anomaly: Case Of Indonesia. *J Bioecon*. (2012) 14, 129–146.

Brockman, P., & Michayluk, D. (1997). The Holiday Anomaly: An Investigation of Firm Size Versus Share Price Effect. *Quarterly Journal of Business and Economics*. 36(3), 23-35.

Cifuentes, J. C. A., & Cordoba, B. E. G. (2013). The Day-of-the-Week Effect: The CIVETS Stock Markets Case. *Journal of Applied Business and Economics*. 15(3), 102-116.

Dhatt, M. S., Kim, Y. H,& Mukherji, S. (1999). The Value Premium for Small Capitalization Stocks. *Financial Analysts Journal*. 55(5), 60-68.

Das, P. K., & Rao, S. P. U. (2011). Value Premiums and The January Effect: International Evidence. *The International Journal of Business and Finance Research*. 5(4), 1-15.

Deyshappriya, N. P. R. (2014). An Empirical Investigation on Stock Market Anomalies: The Evidence from Colombo Stock Exchange in Sri Lanka. *International Journal of Economics and Finance*. 6(3), 177-187.

Dicle, M. F., & Levendis, J. D. (2012). The Day-Of-The-Week Effect Revisited: International Evidence. *J Econ Finan*. 2014 (38), 407–437.

Firdaus, M. (2011). *Econometric Applications for Panels and Time Series Data*. Bogor (ID): IPB Press.

Husnan, S. (1998). *Fundamentals of Portfolio Theory and Analysis of Securities*. *Third Edition*. Yogyakarta: UPP AMP YKPN.

Iramani, R., & Mahdi, A. (2006). A Study Of The Effect Of Trading Days On Stock Returns On Jakarta Stock Exchange. *Jurnal Akuntansi dan Keuangan*. 8(2), 63-70.

Mangala, D., & Lohia, V. (2013). Market Efficiency in Emerging Economies: An Empirical Analysis of Month-of-the-Year Effect. *The IUP Journal of Applied Finance*. 19(3), 19-38.

Mouselli, S., & Al Samman, H. (2016). An Examination of the Month-of-the-year Effect at Damascus Securities Exchange. *International Journal of Economics and Financial Issues*. 6(2), 573-577.

Naughton, T., & Veeraghavan, M. (2005). A Multifactor Model Explanation of The Anomalies in The Cross Section of Expected Stock Returns: Evidence from Indonesia, Singapore and Taiwan. *Finance India*. 19(1), 135-157.

Prasetyo, W. B. (2016). Investor Diperkirkaan Mulai Melirik Saham Lapis Kedua. [Internet]. [Downloaded on March 21 2017]. Available at: http://www.beritasatu.com/pasar-modal/374332-investor-diperkirkaan-mulai-melirik-saham-lapis-kedua.html

Philpot, J., & Peterson, C. A. (2011). A brief history and recent developments in day-of-the-week effect literature. *Managerial Finance*. 37(9), 808-816.

Shiller, I., & Radikoko, I. (2014). Testing Weak-Form Market Efficiency On The TSX. 30(3), 647-658.

Singh, S. P. (2014). Stock Market Anomalies: Evidence from Emerging BRIC Markets. *Vision*. 18(1), 23–28.

Switzer, L. N. (2012). The relative performance of small cap firms and default risk across the business cycle: international evidence. *International Journal of Business*. 17(4), 379-396

Werastuti, D. N. S. (2012). Anomali Pasar Pada Return Saham : The Day Of Week Effect, Week Four Effect, Rogalsky Effect, dan January Effect. *Jurnal Ilmiah Akuntansi dan Humanika*. 2 (1), 1-18.