The day of the week effects in Indonesia, Singapore, and Malaysia stock market

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Efficient market stated that stock's return is indifferent in each trading day. But, the day of the week effects phenomenon made a different return in each single day in a week. This is an abnormal return which can affect investor in deciding investment strategy, portfolio selection, and profit management. We are researching the day of the week effects in Indonesia, Singapore, and Malaysia stock markets in order to get the information whether this anomaly is exist or not at the three countries.

We use AR-EGARCH econometric models to answer our objective. The result shows that there is positive abnormal return on Friday in Indonesia and Malaysia. However, there is no Friday positive abnormal return in Singapore. Besides, our study also concludes that there is no Monday negative abnormal return in all of three countries.

Keywords: *The day of the week effects, anomaly, abnormal return, AR-EGARCH*

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Background

Every investor expecting high return and low risk investment. Actually, investor doesn't exactly now the exact risk and return on his/her investment. So, before doing an investment they will conduct investment analysis. Investment analysis could be done by researching the existing anomalies, stock's fundamentals, and global economic condition.

The efficient market hypothesis suggests that all securities are priced efficiently to fully reflect all information of the intrinsic value. In financial markets, especially in equity returns, there is seasonal effects that effecting higher or lower equity returns than its intrinsic value. We can call this as an anomaly because it can't be explained by existing theories. The existence of anomaly is effected by several factors, such as: firm's characteristic and calendar anomaly.

Every firm's characteristic in a single country is different one to another. Factors that effected firm's characteristic are size, earnings to price ratio (E/P), cash flow to price ratio (CF/P), sales growth, and book to market equity ratio (B/M). A research in UK using data from July 1, 1980 until June 30, 2000 showing that there is no relation between size and return. Meanwhile, research in Singapore using 1988-1996 data concludes size and return is related each other. Wong and Lye (1990) conducting research in Singapore using data from year 1975 until 1985 found the same evidence. Moreover, they found that there is significant relation between E/P and return. Research by Pettengill, et. al. (2002) concludes there is a significant relationship between size and return whether in up or down markets.

Study on calendar anomaly needed long-term period of stock's historical price. Availability of data allowing researchers to study on calendar anomaly using different statistical test. Stock's historical price can be

used to predict future price. Historical price has important implication for financial markets, especially for seasonal behavior researcher. Many researches have been done in different countries researching calendar anomaly, such as: the day of the week effects, January effects, and the month of the year effects.

The day of the week effects is the most well known anomaly in capital markets. This anomaly also known as weekend effect or blue Monday effect. Observation of the day of the week effects show there is difference return on each day in a week. The day of the week effects caused by market sentiment that effected investors become irrational in capital market. This anomaly has important implication for investors in deciding investment strategy, portfolio selection, and profit management. In other words, study of calendar anomaly reveals that investor can use the existing anomalies for predicting stock price movement in certain days.

These anomalies effected market efficiency, because although price of asset is not changing but prediction is made by investor using these anomalies. This allowing investor to develop trading strategy for getting abnormal return based on the anomalies. For example, an investor could be selling the securities on Friday and buy it on Monday to get the profit. Based on previous research by Gibbon and Hess (1981), they found stock return in US significantly lower on Monday and higher on Friday. Jaffrey and Westerfield (1985) found international evidence with same pattern. There are many international evidence in stock market in emerging markets founded by Condoyanni, et. al. (1987) and Ajayi, et. al. (2004).

The objective in this research is to find out the existence of the day of the week effects anomaly in Indonesia, Singapore, and Malaysia stock markets.

Literature Review

Anomalies

An event considered as anomaly when the event is hard to explain rationally with existing theories or illogical assumptions are needed to explain the current paradigm. There are two kinds of anomalies: firm's characteristic anomaly and calendar anomaly.

Firm's Characteristic Anomaly

Basu (1977), Banz (1981), Rosenberg, et. al. (1985), and Lakonishok, et. al. (1994) conclude that stock's return positively correlated with E/P, CF/P, and B/M. Meanwhile, stock's return is negatively correlated with size and sales growth.

An empirical study analyzes relationship between firm's characteristic and return. A large capitalization firm resulting in higher return than small cap. Reingaum and Banz (1981) found abnormal return in small capitalization firm.

In 1989, Jaffe, et. al. conducting research testing the relationship between stock's return, size, and E/P in accordance with January effect. They found that size effect is significant just in January. Meanwhile, E/P is significantly happened every month.

In 1990, Wong and Lye conducting research in Singapore using 1975-1985 data showing that stock's return in Singapore related with firm's size and E/P.

In 1994, Davies found that B/M, E/P, CF/P, and sales growth are significantly correlated with return only in January.

In 1998, Chui and Wei testing about evidence between stock's return with B/M and stock's return and firm's size in Hong Kong, Korea, Taiwan, Malaysia, and Thailand. They found that stock's return and B/M positively correlated in Hong Kong, Korea, and Malaysia. Besides, size effect is founded in all countries but Taiwan.

Calendar Anomaly

The first ever studies in calendar anomaly starting in 1930s. Some research documented there is time difference pattern to obtain return. Return can be systematically higher or lower depends on time difference. Some kind of fixed calendar anomaly is: the time of the day effect, the day of the week effect, the week of the month effect, and the month of the year effect.

Several researches shows distribution of stock's return is not same for each day in a week. Major result of the researches is Monday return is lower than any other day in a week. Lower Monday return caused by high trading activity by investor buy stock in first day of the week. Besides, there is also high sell action because of unfavorable information that came to the market after closing of trading day in Friday.

There is also evidence that return in Friday is higher than any other day in a week. Though, several researches show that this anomaly could be different in one to another country.

There is also January effect, which means return in January is higher than another month in a year. Research in Japan show January effect is caused by bonus distribution in December. So, many investors invest their bonus in January.

Besides of fixed calendar anomaly as we have discussed, there is also moving calendar anomaly. Example of moving calendar anomaly is holiday effect and Ramadhan effect. If bonus distribution in Japan usually in January, in Indonesia most of company giving bonus (holiday allowance) in Ramadhan. So, there is a possibility that investor doing investment after having their bonus/allowance.

Previous Research

As noted before, some research has been done to testing the difference of time pattern in stock price. First research about the day of

the week effects in US conducted by Gibbon and Hess in 1981. With sample period from 1962 until 1978, and using S&P 500 and CRSP indices.

When they divided data to sub-period, they found the lowest return in Monday. Only in November 1974 until December 1979, there is negative return in Tuesday. Gibbon and Hess also reported significantly higher return on Wednesday and Friday.

In 1985, Jaffe and Westerfield researching the day of the week effects anomaly in four international stock markets (UK, Japan, Canada, and Australia). In UK and Canada, lowest return happened on Monday. While in Japan and Australia is on Tuesday. Jaffe and Westerfield documented new evidence for the negative Tuesday effect.

In 1987, Condoyanni, et. al. doing research in six countries (Canada, UK, Australia, France, Japan, and Singapore in period 1969 until 1984). Their result confirmed there is Monday negative return in Canada and UK. And there is Tuesday negative return in France, Japan, Australia, and Singapore. Their research proved this anomaly is different for market in one region/continent.

Research by Lakonishok and Smidt in 1988 also documented Monday negative return in US capital market. In 1997, Arsad and Coutts doing research in this anomaly using data from year 1935 to 1994 using FT30 index. They also found Monday's return is significantly negative compared to another day.

Brooks and Persand are doing research ofthe day of the week effects in emerging markets in 2001. They research on Taiwan, South Korea, Philippines, Malaysia, and Thailand. In Thailand and Malaysia, there is significant positive return on Monday and negative return on Tuesday. In Taiwan, there is negative return on Wednesday.

In 2004, Ajayi, et. al. found more evidence for the day of the week effects in emerging markets. They research in 11 East European countries. Their research indicating negative return on Monday in six countries and Monday positive return for five other countries.

Basher and Sadorsky in 2006 researching all emerging markets in the world. They found the day of the week effects in three countries (Philippines, Pakistan, and Taiwan) from 21 countries they are researching. Taiwan has Friday positive effect, Pakistan has Tuesday negative effect, and Philippines has Tuesday positive effect.

Hypothesis Development

From earlier discussion and explanation, we can point out major result from previous research. One of the result is return in Monday is lower than any other day in a week. Besides, there is also evidence that concludes return in Friday is higher than another day in the week.

From result of previous research, we develop two hypothesis:

1. There is positive abnormal return on Friday in Indonesia, Malaysia, and Singapore.
2. There is negative abnormal return on Monday in Indonesia, Malaysia, and Singapore.

Methodology

Data used in this research are main indices of each capital markets (JKSE, STI, and KLSE) and S&P Global 1200 indices. For computing percentage of daily return, we use:

$$R_t = 100 \times \ln(I_t / I_{t-1})$$

where:

R_t = return at period t,

I_t = stock indices at period t.

Econometric models we use in this research is Exponential GARCH (EGARCH) developed by Nelson (1991). EGARCH model have some advantages than GARCH. Firstly, since using of ln (σ_t^2)

though with negative parameter σ_t^2 will still resulted positive. Second, it allows asymmetries. The models are:

$$R_t = \sum_{i=1}^{5} d_i \delta_{it} + \sum_{i=1}^{k} e_i R_{t-i} + \beta_i \sum_{i=1}^{5} R_{global} + \varepsilon_t$$

where

$$\ln(\sigma_t^2) = \omega + \sum_{j=1}^{p} \beta \ln(\sigma_{t-1}^2) + \sum_{i=1}^{q} \gamma \frac{\mu_{t-1}}{\sqrt{\sigma_{t-1}^2}} + \sum_{i=1}^{r} \alpha \left[\frac{|\mu_{t-1}|}{\sqrt{\sigma_{t-1}^2}} - \sqrt{\frac{2}{\pi}} \right]$$

$\sum_{i=1}^{5} d_i \delta_{it}$ = dummy variable from Monday to Friday,

$\sum_{i=1}^{k} e_i R_{t-i}$ = indices lag return,

$\beta_i \sum_{i=1}^{5} R_{global}$ = S&P Global 1200 indices,

ε_t = error

$\sum_{j=1}^{p} \beta \ln(\sigma_{t-1}^2)$ = effect from previous variance,

$\sum_{i=1}^{r} \alpha \left[\frac{|\mu_{t-1}|}{\sqrt{\sigma_{t-1}^2}} - \sqrt{\frac{2}{\pi}} \right]$ = effect from previous error,

$\sum_{i=1}^{q} \gamma \frac{\mu_{t-1}}{\sqrt{\sigma_{t-1}^2}}$ = asymmetries effect.

## Result and Discussion

Descriptive Statistics

Table 4.1 to 4.3 will show histogram and descriptive statistics for three countries. In Table 4.1, maximum value of 9.242485 is on January 24, 2008. This high value is because of deletion data on January 23, 2008 caused by missing data of KLSE on that day. Meanwhile, minimum value also caused by deletion data on May 12, 2006. On that day, data of KLSE also doesn't exist.

In Table 4.2, maximum value of 2.919832 is happened on August 20, 2007. Deletion data on August 17, 2007 because of there isn't trading in Indonesia on that day (Independence Day) causing this maximum value. Otherwise, minimum value is on March 10, 2008 because of missing data on KLSE on March 7, 2008 so the whole data should be deleted.

In Table 4.3, maximum value is return on January 24, 2008. On January 23, we haven't found data in KLSE so we must delete all data of the indices. Minimum value caused by significant declining value of STI on January 21, 2008. STI index lost 187.1 point from previous trading day, made its downturn from 3,104.25 to 2,917.15.
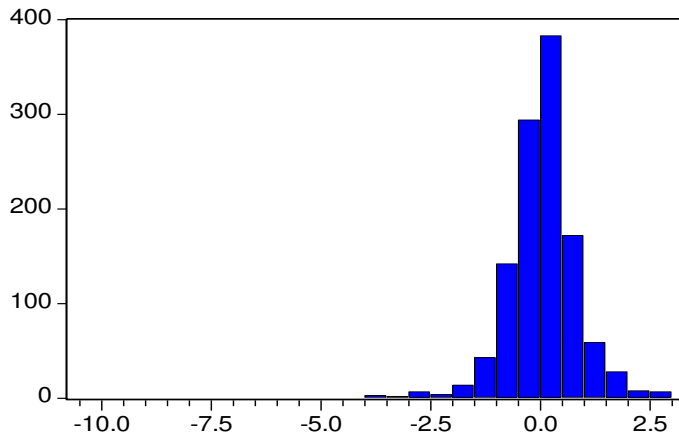
Table 4.1 Histogram and descriptive statistics for JKSE (Indonesia)
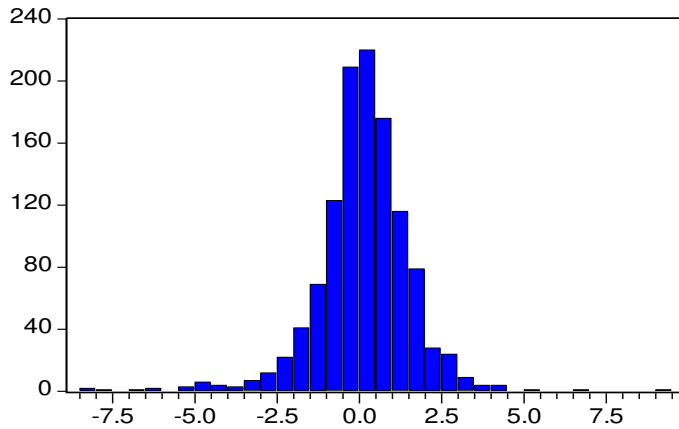
Series: JKSE	
Sample 1 1169	
Observations 1168	
Mean	0.131500
Median	0.184954
Maximum	9.242485
Minimum	-8.287446
Std. Dev.	1.448392
Skewness	-0.660175
Kurtosis	8.636902
Jarque-Bera	1631.209
Probability	0.000000

Source: Processed data

Table 4.2 Histogram and descriptive statistics for KLSE (Malaysia)

Series: KLSE	
Sample 1 1169	
Observations 1168	
Mean	0.045972
Median	0.070089
Maximum	2.919832
Minimum	-10.23737
Std. Dev.	0.849004
Skewness	-1.944565
Kurtosis	23.59203
Jarque-Bera	21372.32
Probability	0.000000

Source: Processed data

Table 4.3 Histogram and descriptive statistics for STI (Singapore)
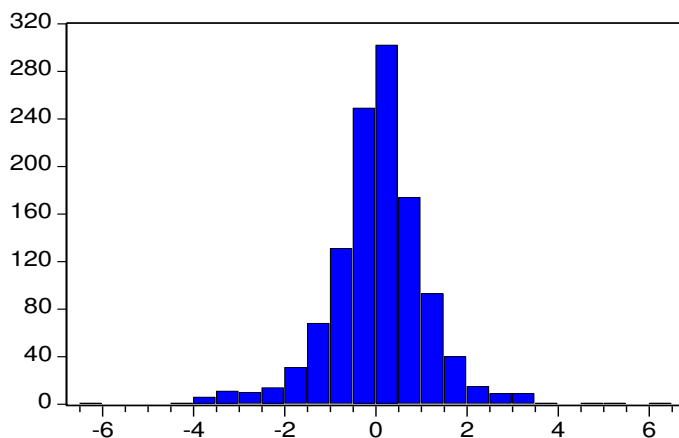
Series: STI	
Sample 1 1169	
Observations 1168	
Mean	0.060314
Median	0.101170
Maximum	6.206188
Minimum	-6.216503
Std. Dev.	1.093037
Skewness	-0.234740
Kurtosis	6.711862
Jarque-Bera	681.2520
Probability	0.000000

Source: Processed data

Result of OLS Model Testing

A good model must be should be under assumption where var (u$_t$) = σ^2 < ∞. If error in the research has no constant variance, it called as heteroscedasticity. Residual testing with ARCH-LM test in Ordinary Least Square method is being done in order to find out whether there is heteroscedasticity in OLS model being used. With 5% significance level, the hypothesis for the testing is there is no autoregressive conditionally heteroscedastic. While alternate hypothesis is there is autoregressive conditionally heteroscedastic.

Table 4.4 ARCH-LM test for OLS model

	JKSE	KLSE	STI
F-statistic	26.50871***	10.8907***	19.27419***

Source: Processed data
Note: *** significant in 1%

From table 4.4, the results are significant in 1% while we are using 5% significance level. So, we can conclude that our hypothesis is rejected which means there is autoregressive conditionally heteroscedastic. It shows that we should applying GARCH model in this research.

Result of EGARCH Model Testing

In this section, we will discuss the result of EGARCH model testing for three indices (Indonesia, Singapore, and Malaysia) with applying S&P Global 1200 index as risk factor in the model.

Analysis of Indonesia (JKSE)

In table 4.5, we can see that JKSE index (Indonesia) affected significantly with 99% confidence level by positive return on Friday as of 0.3887% (coefficient in FRI plus C). JKSE index also affected significantly by Wednesday positive return as of 0.2193% in 10% significance.

For Monday return (0.0512%), Tuesday return (0.2128%), and Thursday return (0.2172%) don't affected JKSE index. S&P Global 1200 index as risk factor showing significance in 1% on Monday, Wednesday, Thursday, and Friday. And 10% significance on Tuesday.

Table 4.5 Result of EGARCH Model Testing

Parameter	JKSE	KLSE	STI
C	0.051152 [a]	-0.019717	0.073707
	(0.075558) [b]	(0.036722)	(0.047841)
TUE	0.161626	0.049806	-0.051148
	(0.100563)	(0.057332)	(0.067249)
WED	0.168128*	0.066184	-0.000304
	(0.102140)	(0.049751)	(0.069185)
THU	0.165992	0.103491**	0.002084
	(0.108262)	(0.048392)	(0.067604)
FRI	0.337477***	0.148172***	0.051916
	(0.106130)	(0.056717)	(0.072844)
MMON	0.927136***	0.322023***	0.963324***
	(0.081490)	(0.041817)	(0.054697)
MTUE	0.162635*	0.129590**	0.473374***
	(0.091777)	(0.054373)	(0.075811)
MWED	0.422919***	0.091927**	0.532464***
	(0.086052)	(0.045064)	(0.065308)
MTHU	0.629293***	0.108087**	0.599694***
	(0.093030)	(0.051059)	(0.074411)
MFRI	0.308151***	0.082215	0.314718***
	(0.113596)	(0.060263)	(0.082221)
JKSE(-2)	-0.055410**		
	(0.028026)		
KLSE(-1)		0.076922**	
		(0.032168)	
STI(-1)			-0.109345***
			(0.026573)
C(12)	-0.200431***	-0.208131***	-0.128342***
	(0.028029)	(0.020998)	(0.019021)
C(13)	0.316576***	0.243895***	0.163251***
	(0.041776)	(0.022006)	(0.024085)
C(14)	0.082198***	0.070192***	0.030418***
	(0.024690)	(0.019157)	(0.018608)
C(15)	0.909583***	0.964468***	0.987434***
	(0.022793)	(0.009419)	(0.005475)
R-squared	0.145564	0.092537	0.272628
Adjusted R-squared	0.135171	0.081509	0.263788
F-statistic	1.400625	8.390978	3.084164
Prob(F-statistic)	0.000000	0.000000	0.000000

Source: Processed data using EViews 5

Notes: [a] coefficient, [b] standard error

*** significant in 1%, ** significant in 5%, * significant in 1%

This model is significant in 5% by using lag 2. Besides, this model is suitable with EGARCH model because the variance equation is significant in 1%.

R-squared for JKSE explaining that independent variable is able to explain its affect to dependent variable as of 14.56%. The rest is explained by other variables. Adjusted R-squared of 0.135171 explaining that independent variable could explain its affect to dependent variable as of 13.52%, meanwhile the rest is explained by other variables.

The number of F-statistic and its probability showing us there is a suitability of model employed in this research and this model wholly affecting dependent variable.

In analysis of JKSE index, we can made a conclusion that there is positive abnormal return in Indonesia on Friday, and Monday negative abnormal return doesn't exist in Indonesia.

Analysis of Malaysia (KLSE)

As we can see in table 4.5, KLSE index is significantly affected by positive return on Friday as of 0.1285% with 99% confidence level. KLSE index also significantly affected by Thursday positive return as of 0.0838% with 95% confidence level. Meanwhile, Monday, Tuesday, and Wednesday return don't affected KLSE index. S&P Global 1200 as risk factor showing significance in 1% on Monday, 5% on Tuesday to Thursday, and doesn't significant on Friday.

This model is significant in 5% by applying lag 1. With variance equation also significant in 1%, we can conclude that using of EGARCH model in this research is suitable.

R-squared result of KLSE is 0.092537, and adjusted R-squared is 0.081509. This means that independent variable could explain its affect to dependent variable as of 9.25%. Meanwhile, the rest of 90.75% is explained by other variables.

Result of F-statistic and its probability of KLSE showing the suitability of model for us to making conclusion from the result.

From analysis of KLSE result above, we can conclude that there is positive abnormal return on Friday in Malaysia and there is no negative abnormal return on Monday.

Analysis of Singapore (STI)

Result on table 4.5 telling us that STI isn't affected significantly by daily return on Monday to Friday because of significance level above 10%. Meanwhile, S&P Global 1200 index as risk factor showing significance in 1% on Monday until Friday.

This model is significant in 1% by using lag 1. Besides, using of EGARCH model in this research is suitable for variance equation is significant in 1%.

R-squared and adjusted R-squared for STI is consecutively 0.272628 and 0.263788. Interpretation of R-squared result for STI is 27.26% of dependent variable could be explained by independent variable, while 72.74% is explained by other variables.

Result of F-statistic and its probability confirmed that this model is suitable and could explain the whole dependent variable.

Therefore, we can conclude that there is no such a Friday positive abnormal return and Monday negative abnormal return exists in Singapore.

Analysis of EGARCH Testing

Efficient market hypothesis saying that stock return is not different in each trading day. On the contrary, the day of the week effect anomaly stated that there is return difference on each trading day in a week. The return difference called by abnormal return.

From our analysis of EGARCH testing above showing there is no negative abnormal return on Monday. Meanwhile, positive abnormal return on Friday found in Indonesia and Malaysia. This phenomenon could be affected by profit taking action by

investor in Friday. This action could be caused by uncertainties risk when Saturday and Sunday. If there were bad news on weekend could be causing many investor sell their stocks. But, these can't be explained the anomaly because of the result could be different if we are applying different sample data.

From table 4.5 we can see that this model is suitable with EGARCH because variance equation for three countries is significant in 1%. Coefficient C12 for JKSE, KLSE, and STI showing negative variable consecutively -0.200431, -0.208131, and -0.128342. This is not a problem because of EGARCH model could handle non-negativity.

From the three, JKSE is the most reactive if compared to KLSE and STI. This means when stock price declining significantly, directly reacted to dependent variable. It could be seen from ARCH (C13) where value of JKSE is 0.316576, KLSE 0.243895, and STI 0.163251. Leverage effect (C14)

value also highest on JKSE (0.082198), where KLSE and STI consecutively 0.070192 and 0.030418. Persistency means a consistent event in long-term period. In context of persistency/consistency, we can analyze from GARCH (C15) where we can found that STI index is the most persistent compared to KLSE and JKSE.

Conclusion

Our research is conducted by applying EGARCH model because of heteroscedasticity has been found by ARCH-LM test. Overall, EGARCH model is applicable to our research model because variance equation for three countries showing significancy in 1%.

The conclusion of our research based on our objective are as follows:

1. In Indonesia, first hypothesis is not rejected because there is positive abnormal return on Friday with 1% significance level. Second hypothesis is rejected because there is no negative

abnormal return on Monday in Indonesia.

2. In Malaysia, first hypothesis is not rejected because there is Friday positive abnormal return with 99% confidence level. Meanwhile, second hypothesis is rejected because Monday negative

abnormal return does not exist in Malaysia.

3. In Singapore, both of first and second hypothesis is rejected. There is no abnormal return on Monday and Friday in Singapore.

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