

Day of the Week Effect, Annual Returns and Volatility of Five Stock Markets in Southeast of Asia

Mansoorh Kazemi Lari (Corresponding author)

Dept. of Mathematical Science, Faculty of Science

Universiti Teknologi Malaysia (UTM), 81310, Johor Bahru, Johor, Malaysia

Tel: 60-12-665-7562 E-mail: Kazemilari_m@yahoo.com

Abbas Mardani

Dept. of Management, Faculty of Management and Human Resource Development,

Universiti Teknologi Malaysia (UTM), 81310 Johor Bahru, Johor, Malaysia

Tel: 60-17-665-1841 E-mail: abbas.mardani.2000@gmail.com

Mohsen Aghaeiboorkheili

Ibnu Sina institute of fundamental science studies

University Teknologi Malaysia, 81310 UTM Skudai, Malaysia

E-mail: drmohsenaghaei@yahoo.com

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Abstract

In this study, we analyze the annual returns, returns fluctuation and the day of the week effect for five stock markets in Southeast of Asia (Indonesia, Malaysia, Philippine, Singapore and Thailand) from 31, December 2007 to 31, December 2011. Non-parametric tests and parametric test are used for equality of variance returns and equality of mean returns on the daily returns of the week. Graphical representation of indexes annual changes and their correlation were explored to employ this analysis. The results indicate that all of the indexes experienced high negative changes in 2008 and after this decline, market index growth enormously. Especially Indonesia experienced the highest increase. There was generally high volatility of returns. The results of the Levene's test of the equality of standard deviations of

the returns at the 5 percent confidence level reject the Null Hypothesis that mean returns are not equal across the days of the week for all the markets except for Indonesia and Malaysia.

Keywords: Annual Returns Analysis, Day- of- the- Week effect, Volatility of Returns

1. Introduction

Seasonality or calendar anomalies such as month of the year and day of the week effects has remained a topic of interest for research since a long time ago in both developed and developing countries. In stock markets, various studies have been extensively conducted and published on financial market anomalies which deal with the cross-sectional and time series patterns of world market returns using annual return data.

Seasonality in stock returns was first reported by Wachtel (1942). Rozeff and Kinney (1976) documented the January effect in New York Exchange stocks, and Brown, Keim, Kleidon, and Marsh (1983) studied the Australian stock market seasonality. Keim (1983) studied the seasonality and size effects in stock returns while Gultekin and Gultekin (1983) examined the presence of stock market seasonality in 16 industrial countries. Mills and Coutts (1995) studied the calendar effect in FTSE 100, Mid 250 and 350 indices for the period 1986 and 1992. Choudhry (2000) reported January effect on the UK and US stock returns. Chordia, Roll, and Subrahmanyam (2001) studied NYSE-listed stocks from 1988 to 1998 and found a strong day-of-the-week effect where trading activity is relatively high on Tuesdays and low on Fridays. Fountas and Segredakis (2002) studied 18 markets and reported seasonal patterns in returns. Meanwhile, Ariel (2012) has also conducted similar studies on US market indices from 1963 to 1981.

Although calendar anomalies in developed equity markets have been investigated extensively, little attention has been paid to Asian markets. Moreover, most studies of Asia anomaly focused more on seasonal or cross-sectional of stock returns. These tests are different from time series tests, which emphasize on the predictability of return rates over time (Claessens, 1995). To the best of the author's knowledge, empirical research on the day-of-the-week effect in Asian stock markets is fragmented, thus this current study attempts to fill this gap.

In this paper, we examine the characteristics of daily and annual returns and the volatility of returns of five southeast financial market indexes namely: Kuala Lumpur Composite (Malaysia); Jakarta Composite (Indonesia); Manila Composite (Philippines); Straits Times (Singapore); SET (Thailand).

2. Literature Review

The efficient market hypothesis (EMH) is considered one of the most debated and investigated issues in finance literatures. It states that a market is considered to be efficient if it reacts and responds quickly and accurately to all available information. Fama (1970) classified market efficiency into three forms: weak-form EMH, semi-strong form EMH, and strong form EMH. Over the last decades, however, numerous empirical studies have indicated persistent and potentially exploitable days-of-the-week patterns in both stock returns and volatility in many countries. These daily anomalies present a challenge to the EMH and have attracted much attention from economists and market practitioners. From a financial perspective, there are three important reasons for examining the daily anomalies in the markets. Firstly, the discovery of anomalous patterns in stock returns is important because of their effects on the trading strategies of investors (Berk & Güven, 2003).

Secondly, it provides extra information for rational decision-makers to become more aware of

variations in stock returns volatility due to the day-of-the-week effect. Rational decision-makers can also determine whether high or low returns are associated with a correspondingly high or low volatility for a given day. If investors can identify a certain pattern of volatility, it becomes easier to make investment decisions based on both projected returns and risks associated with a particular security (Kiymaz & Berument, 2003). Thirdly, the investigation of anomalous patterns may reveal evidence about the extent of market efficiency.

2.1 Day-of-the Week Effect

The earliest examination of the Day-of-the-week-effect in stock returns seems to go back to the study by Cross (1973) and around the period of 1980s; French (1980), Lakonishok and Levi (1982), Gultekin and Gultekin (1983), Keim (1983), Keim and Stambaugh (1984), Rogalski (1984), Theobald and Price (1984), Harris (1986), Smirlock and Starks (1986), Jaffe and Westerfield (1989) had investigated this effect across different markets. This topic continues to be one of the most researched topics even until today, for example; Balaban (1995), Chusanachoti and Kamath (2002), Kiymaz and Berument (2003), Kohers et al. (2004), Kok and Wong (2004), Brusa et al. (2005), Cai et al. (2006), Chukwuogor-Ndu (2007), Kenourgios et al. (2008), Marrett and Worthington (2009), Anwar and Mulyadi (2009), Blau, Van Ness, and Van Ness (2009), Christophe, Ferri, and Angel (2009), Naliniprava (2010), Sutheebanjard and Premchaiswadi (2010), Worthington (2010), Faryad, Kashif, and Rana (2011), Mine and Ikram (2011), Abdullah et al. (2011), Ulussever et al. (2011) and Al-Jafari (2012) had revealed evidence of the presence of day-of-the-week effect.

On the contrary, some researchers have found no evidence for the days-of-the-week effect on stock markets. For instance, Santesmases (1986), Pena (1995), Gardeazabal and Regulez, (2003) documented on insignificant weekday effects on the Spanish stock market. Brooks and Persaud (2001) also found no day-of-the-week effect in the Philippines stock market. Marashdeh (1994) and Davidson and Peker (1996) concluded that there is no day-of-the-week effect on the Malaysian stock market. Demirel and Karan (2002) studied in the Turkish stock market and did not find clear evidence of “the effect” even though they noted that Friday returns were “consistently high”. Aly et al. (2004) studied the Egyptian market and showed that there was no significant difference between daily mean returns. In a study for a small offshore market of Mauritius, Agathee (2008) suggested no significant existence of the calendar effect.

3. Research methodology

In this section, we apply some tests to determine the day-of-the-week effect, daily returns and volatility returns. The data consist of daily closing prices excluded public holidays of the following indexes: Kuala Lumpur Composite (Malaysia) index; Jakarta Composite (Indonesia) index; Manila Composite (Philippines) index; Straits Times (Singapore) index and SET (Thailand) index for the period 2008-2012. During this period trading will be conducted Monday to Friday.

To interpret the trends of returns and depict the annual trends in the stock market movement, we use the closing index values. The logarithmic return of daily stock returns is defined as: $\ln(P_t) - \ln(P_{t-1})$.

Where P_t is a daily return of stock at time t . Basic statistics of return are used to find out the

distributions of daily returns and volatility such as standard deviations, variance, coefficient of variation, skewness and kurtosis.

Since the distributions of the returns are non normal, we use the Kruskal-Wallis one way analysis of variance which is a nonparametric method for testing equality of means (Hourvoulades, 2009). To examine the difference in the returns across the days of the week, The Kruskal-Wallis test is calculated for checking the equality on mean returns as:

$$K = \frac{12}{N(N+1)} \sum_{j=1}^k \frac{R_j^2}{n_j} - 3(n+1)$$

Where k is the number of samples; n_j is the number of observations in j^{th} sample; $N = \sum n_j$ is the total number of observations; R_j is the sum of ranks in the sample when N values are ranked together.

For the equality of variance across the days of the week, we employ the Levene's homogeneity test for equality of variance across the days of the week

$$F = \left[\sum_{j=1}^J n_j (D_j - D)^2 / \sum_{j=1}^J \sum_{i=1}^{n_j} (D_{ij} - D_j)^2 \right] \times \left[\frac{(N-J)}{(J-1)} \right]$$

Where $D_{ij} = |R_{ij} - M_{ij}|$, R_{ij} is the return for week i and weekday j for $j = 1, 2, \dots, J$ and $J = 5$.

The Bartlett's test is also employed to check the equality of variance is called homogeneity of variances that is more sensitive than Levene's test (Snedecor & Cochran). The Bartlett's statistic is as follows:

$$M = v \left(a \ln s^{-2} - \sum \ln s_i^2 \right)$$

Where a is the number of samples, v = degree of freedom, $s^{-2} = \sum s_i^2 / a$.

When the degrees of freedom are different, above test is not used. The test criterion is as follows:

$$M = \left(\sum v_i \right) \ln s^{-2} - \sum (v_i \ln s_i^2)$$

$$C = 1 + \left\{ \frac{1}{[3(a-1)]} \right\} \left(\sum \frac{1}{v_i} - \frac{1}{\sum v_i} \right)$$

Where s_i^2 is an estimate of the σ^2 from the sample i , a = the number of samples, v_i is the degree of freedom of samples i .

4. Results

4.1 Returns Analysis of the Week

Table 1 report the basic statistics of returns for each day of the week in total observations of 1042 to specify the distributional properties of Malaysia, Indonesia, Philippines, Singapore and Thailand. Indonesia and Malaysia have negative returns on Monday and Tuesday. Thailand has negative returns on Monday and Thursday and Philippines have negative returns on Monday and Tuesday and Friday while the Singapore has negative return all days except Wednesday.

4.2 Volatility of Returns

In terms of statistics in Table 1, lowest and highest returns are recorded in Jakarta Composite (Indonesia) and SET (Thailand) as a result of high volatility in these returns. The other indicators of return volatility consist of skewness, kurtosis, standard deviation, variance and coefficient of variation had also the high values. The coefficient of variation for Indonesia has a positive return while in Thailand is negative return in the same days on Thursday. However this indicator was also very high for Philippines on Friday. Moreover Malaysia has highest kurtosis and skewness on Monday. This reflects the paucity of the returns relative to their respective standard deviations. It is important to note that the daily returns for all indexes are skewed to the left except for Straits Times (Singapore) Exchange that seem to be more skewed to the right.

Malaysia and Thailand recorded the highest return on Monday, Indonesia on Wednesday, Philippine on Tuesday and Singapore on Thursday. Indonesia, Malaysia and Thailand experienced their lowest return on Monday while Philippine and Singapore experienced their lowest return on Friday. So Malaysia and Thailand recorded the highest and lowest return on Monday. The highest Standard deviation occurred on Monday for all of the stock markets. The lowest standard deviation mostly occurred on Wednesday for Malaysia, Philippine and Thailand. The daily returns exhibited greatest volatility on Monday for all of the markets except for Philippine on Thursday.

4.3 Annual Returns Analysis

In the period 2008 to 2012, all of the countries experienced a decline in the end of 2008. After this drop in the last of October of 2008, Indonesia, Thailand and Philippine have grown enormously: Jakarta Composite (Indonesia) by 244 percent; SET (Thailand) by 167 percent; Manila Composite (Philippines) by 156 percent while Malaysia had a steady trend by 82 percent. Singapore reached a minimum value in March of 2009 then went up by 82 percent. Table 3 shows the annual closing returns of the indexes. In Figure 1, we consider the annual returns and represent the percentage changes related to Annual Returns of Table 3.

During the period (31, December 2007 until 31, December 2011), annual returns of Indonesia increases 39.2 percent; Malaysia 6 percent; Philippine 20.7 percent; Singapore 24 percent and Thailand 19.5 percent. The markets generally declined in 2008 and gained in 2009.

The five closing index values for the period 2008-2012 applied to a regression analysis. The correlation coefficient matrix indicates the correlation among all of the indexes that

calculated by Pearson correlation coefficient is shown in Table 4. All of pair markets have similar and positive correlation between 0.4 and 0.63. The highest correlation 0.628 was between the Jakarta Composite (Indonesia) and the Straits Times (Singapore) Index.

4.4 The Day of the Week Effect

The Kruskal-Wallis test is used to examine the day of the week effect by following null hypothesis and the alternate hypothesis for each stock market.

H_0 : there is equality among the days of the week returns;

H_1 : there is not equality among the days of the week returns.

If the assumption reject the equality among the days of the week returns, this means that there is a difference in the returns across the days of the week and exist the presence a day-of-the-week effect on the returns that in our study accrues only in Indonesia. The results of Kruskal-Wallis test at the 5 percent level show that the Chi-square statistics values are not significant for all markets except Indonesia. In terms of what obtained in Table 5, these results support the existence the day of the week effect just Indonesia stock return in terms of the result of analysis of daily returns for the Kuala Lumpur Composite (Malaysia); Jakarta Composite (Indonesia); Manila Composite (Philippines); Straits Times (Singapore); SET (Thailand) stock markets from 2008 to 2012.

4.5 Homoskedasticity

The equality of the standard deviations examined by the Levene's test employed across the day of the week. As a result of Table 6, the assumptions of homoscedasticity were met in Indonesia and Malaysia.

Philippine, Thailand and Singapore have highly significant Levene's statistic (at the 5 percent level) respectively. It can be concluded that in the Indonesia and Malaysia markets, the daily return seasonalities are not accompanied by any volatility seasonality and investing on the low or high return during weekdays does not necessarily means that risk is also low or high. It is interesting to note that for Philippine that has a highly significant Levene's statistic, the highest return occurs on Wednesday, the same day that the markets experiences the lowest standard deviation. In Thailand and Singapore that have high significant Levene's statistic, the lowest return occurs on Monday when the market experiences the highest standard deviation. This observation seems compatible with the trade-off of normal risk return for higher returns as well as relationships among higher risk returns and lower risk returns.

5. Conclusion

This study analyzed the day-of-the-week effect, annual returns and the volatility of daily returns of five Southeast of Asia stock markets. The results of the Kruskal-Wallis test show the presence of the day of the week effect only in Indonesia and other stock returns including Malaysia, Philippine; Singapore and Thailand do not provide the existence of the daily effect.

We attempted to investigate the high volatility in daily observation of Southeast of Asia stock market. Indonesia and Thailand recorded the maximum and minimum returns. The results of

the other indicators of return volatility had also high value of these two indexes.

Philippine, Thailand and Singapore have high significant Levene's statistic value at the 5 percent level, respectively. So, the assumptions of homoscedasticity were met in Indonesia and Malaysia.

All of five stock return indexes decreased significantly in last of 2008 then they increased between beginning of 2009 and 2012. The changes in annual closing values of the indexes indicate that in general, the markets seem to gain and lose simultaneously. However Indonesia experienced the greatest percentage increase in this period, Malaysia experienced the lowest increase between other markets. Generally, all of the stock markets in this study have grown after a decline in the last months of 2008.

The correlation coefficient matrix indicates that the correlation among all of the indexes is positive; between 0.4 and 0.6.

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Table 1. Basic statistics of returns

	Monday	Tuesday	Wednesday	Thursday	Friday
Mean					
Indonesia	-0.001506	-0.000434	0.002308	0.000173	0.000860
Malaysia	-0.000897	-0.000152	0.000665	0.000319	0.000317
Philippines	-0.000678	-0.001365	0.002142	0.000882	-0.000134
Singapore	-0.001024	-0.000845	0.001108	-0.000297	-0.000377
Thailand	-0.001167	0.000248	0.000731	-0.000128	0.000848
Median					
Indonesia	-0.000097	0	0.002926	0.000600	0.0004352
Malaysia	0	0	0.000864	0.000197	0
Philippines	0	-0.000728	0.001983	0.000389	0
Singapore	0	-0.000182	0.001506	-0.000234	0
Thailand	0	0	0.002096	0.000698	0.001192
Maximum					
Indonesia	0.073628	0.062383	0.076234	0.052681	0.068192
Malaysia	0.040551	0.028005	0.026538	0.028701	0.033750
Philippines	0.049837	0.070560	0.043754	0.046251	0.045872
Singapore	0.063639	0.055912	0.049232	0.075305	0.056203
Thailand	0.075487	0.052919	0.032799	0.060994	0.041853
Minimum					
Indonesia	-0.105675	-0.080103	-0.0109539	-0.092997	-0.071555
Malaysia	-0.099785	-0.039179	-0.035180	-0.031940	-0.036807
Philippines	-0.0130887	-0.056743	-0.049229	-0.053232	-0.086981
Singapore	-0.062165	-0.042293	-0.068388	-0.053965	-0.086960
Thailand	-0.110902	-0.042844	-0.071271	-0.054430	-0.100994
Standard Deviation					

Indonesia	0.018976	0.016591	0.017791	0.016336	0.014639
Malaysia	0.011135	0.008245	0.007880	0.008568	0.008458
Philippines	0.016691	0.014716	0.012370	0.013539	0.013838
Singapore	0.017644	0.013336	0.014492	0.015295	0.014100
Thailand	0.019354	0.015175	0.013410	0.014647	0.014276
Skewness					
Indonesia	-0.0568902	-0.290924	-0.895448	-1.162683	-0.464237
Malaysia	-3.178384	-0.456030	-0.520078	-0.330540	-0.184831
Philippines	-2.558812	0.238628	-0.141149	-0.574296	-0.935930
Singapore	0.020217	0.282502	-0.375711	0.626146	-1.294918
Thailand	-0.812219	0.276306	-1.060338	-0.024374	-1.879603
kurtosis					
Indonesia	6.780524	3.648543	9.451008	6.039140	5.837154
Malaysia	30.128948	3.676943	3.351936	2.200489	3.973636
Philippines	17.893892	4.868837	2.158542	2.367858	7.710789
Singapore	1.916244	2.073026	3.843113	4.210506	10.754751
Thailand	6.19498	1.422250	3.652336	3.372682	13.610629
Variance					
Indonesia	0.000360	0.000275	0.000317	0.000267	0.000214
Malaysia	0.000124	0.000068	0.000062	0.000073	0.000072
Philippines	0.000279	0.000217	0.000153	0.000183	0.000191
Singapore	0.000311	0.000178	0.000210	0.000234	0.000199
Thailand	0.000375	0.000230	0.000180	0.000215	0.000204
Coefficient of Variation					
Indonesia	-1259.94094	-3819.90647	770.677314	9451.018148	1701.459505
Malaysia	-1241.098953	-5441.92199	1184.489460	2685.491843	2671.388063
Philippines	-2460.941227	-1078.05209	577.443001	1534.280927	-10291.50842
Singapore	-1723.186503	-1578.68767	1307.890448	-5147.52037	-3735.476078
Thailand	-1658.617323	6114.57897	1834.646440	-11441.4353	1683.623564

Table 2. Summary of Maximum/Minimum Returns/Standard Deviations of five stock markets for the Period December 31, 2008- December 31, 2011

Country/Index	Max (Standard deviation) Mean	Day of Occurrence	Min (Standard deviation) Mean	Day of Occurrence
Jakarta Composite (Indonesia)	0.002308	Wednesday	-0.001506	Monday
	0.018976	Monday	0.014639	Friday
Kuala Lumpur Composite (Malaysia)	0.000665	Wednesday	-0.000897	Monday
	0.011135	Monday	0.007880	Wednesday
Manila Composite (Philippines)	0.002142	Wednesday	-0.001365	Tuesday
	0.016691	Thursday	0.012370	Wednesday
Straits Times (Singapore)	0.001108	Wednesday	-0.001024	Monday
	0.017644	Monday	0.013336	Tuesday
SET (Thailand)	0.000848	Friday	-0.001167	Monday
	0.019354	Monday	0.013410	Wednesday

Table 3. Annual Closing Index Values and two important dates

End of Year	(Indonesia)	(Malaysia)	(Philippines)	(Singapore)	(Thailand)
2007	2745.83	1445.03	3621.6	3482.3	858.1
OCT 2008	1111.39	832.44	1704.41	1600.28	384.15
2008	1355.41	876.75	1872.85	1761.56	449.96
2009	2534.36	1272.78	3052.68	2897.62	734.54
2010	3703.51	1518.91	4201.14	3190.04	1032.76
JULY 2011	4193.44	1558.01	4550.53	3215.27	1144.14
2011	3821.99	1530.73	4371.96	2646.35	1025.32

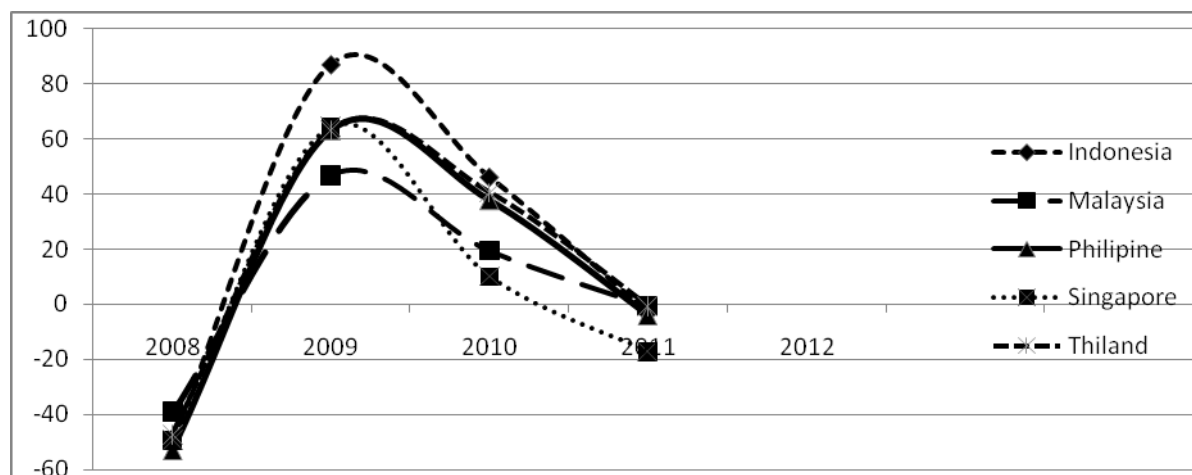


Figure 1. Percent Changes in yearly Returns in five selected Southeast stock Markets

Table 4. Correlation coefficient, Regression Results

Correlation matrix	Jakarta Composite (Indonesia)	Kuala Lumpur Composite (Malaysia)	Manila Composite (Philippines)	Straits Times (Singapore)	SET (Thailand)
Jakarta Composite (Indonesia)	1	0.553046	0.469881	0.628018	0.543608
Kuala Lumpur Composite (Malaysia)	0.553046	1	0.476428	0.564179	0.481748
Manila Composite (Philippines)	0.469881	0.476428	1	0.402785	0.425613
Straits Times (Singapore)	0.628018	0.564179	0.402785	1	0.605116
SET (Thailand)	0.543608	0.481748	0.425613	0.605116	1

Table 5. The result of Kruskal-Wallis test (equality of means)

Index/country	Jakarta Composite (Indonesia)	Kuala Lumpur Composite (Malaysia)	Manila Composite (Philippines)	Straits Times (Singapore)	SET (Thailand)
Chi-square	*10.4711	2.4123	9.3381	7.4712	8.8693
p-value	0.0332	0.6604	0.0532	0.1130	0.0644

Note: *denote significant at 5% level.

Table 6. Results of equality of variance test across day of the week for the period 2008- 2012

Countries/Index	Levene's Test		Bartlett's Test	
	Statistics	P-Value	Statistics	P-Value
Jakarta Composite (Indonesia)	1.6968	0.1484	16.480	0.0024
Kuala Lumpur Composite (Malaysia)	1.1307	0.3405	32.9826	0.0000
Manila Composite (Philippines)	8.1602*	0.0000	98.4733	0.0000
Straits Times (Singapore)	3.9776*	0.0033	20.5923	0.0004
SET (Thailand)	4.4783*	0.0014	35.9643	0.0000

Note: *denote significant at 5% level.