

Volume 30, Issue 2**Stock Market Calendar Anomalies: Evidence from ASEAN-5 Stock Markets**

Shiok Ye Lim

*Labuan School of International Business and Finance,
Universiti Malaysia Sabah*

Ricky Chee-Jiun Chia

*Labuan School of International Business and Finance,
Universiti Malaysia Sabah***Abstract**

To challenge the appropriateness of the theory of the weak-form market efficiency, this study examines the day-of-the-week effect and the twist-of-the-Monday effect for the ASEAN – 5 stock markets for the period June 10, 2002 through August 21, 2009. Our Kruskal-Wallis statistic test finds support for the day-of-the-week effect in Malaysia and Thailand stock markets. In addition, the Wilcoxon Rank Sum Test shows that Monday has significantly lower returns compared to Thursday and Friday returns in Malaysian stock market. On the other hand, Friday has the highest returns in a week and this is significantly different compared with other days in Thailand stock market. This study also found evidence on the twist-of-the-Monday effect, where returns on Mondays are influenced by the previous week's returns in Indonesia, Malaysia and the Philippines stock markets.

I am very grateful for the helpful comments provided by the editor, anonymous referees and the proofreader. Any remaining errors are my own.

Citation: Shiok Ye Lim and Ricky Chee-Jiun Chia, (2010) "Stock Market Calendar Anomalies: Evidence from ASEAN-5 Stock Markets", *Economics Bulletin*, Vol. 30 no.2 pp. 996-1005.

Submitted: Dec 08 2009. **Published:** April 08, 2010.

1. Introduction

The presence of calendar anomalies in stock returns has attracted the attention of researchers to challenge the appropriateness of the theory of weak-form market efficiency (Fama, 1970) since the last two decades. If calendar anomalies in organized stock markets exist, market inefficiency is present and investors should be able to earn abnormal rates of return by predicting the stock market movement on given days. Therefore, calendar anomalies seem to contradict the weak-form market efficiency hypothesis. Gibbons and Hess (1981) and Lakonishok and Levi (1982) are the pioneer researchers who detected empirical evidences of calendar anomalies in U.S. stock market. Their studies showed that the average return on Monday is significantly less than the average returns of other days and this pattern is named as “Monday effect”.

In particular, Jaffe and Westerfield (1985) obtained international evidences of the Monday effect for the markets of Canada, Australia, Japan and the United Kingdom. This study found that these markets exhibited statistically negative average Monday return and high average Friday return. This is further supported by the studies of Keim and Stambaugh (1984), Lakonishok and Smidt (1988), Connolly (1989) and Lakonishok and Maberly (1990). In line with previous studies done in developed countries, Ho and Kok (1995), Arsad and Coutts (1996), Hui (2005), Chukwuogor (2006) and Apolonario *et al.* (2006) reported a negative mean return on Monday for the cases of developed countries and less developed countries¹. In contrast, there are some evidence of no significant negative Monday returns in France (Solnik and Bousquet, 1990), Belgium, the Netherlands and Sweden (Agrawal and Tandon, 1994), Spain (Pena, 1995), Greece (Alexakis and Xanthakis, 1995), South Korea and the Philippines (Brooks and Persaud, 2001).

Besides, the twist-of-the-Monday effect has been widely cited in the finance literature over the past two decades. This phenomenon is first observed by Jaffe *et al.* (1989). They reported that when there is a week of higher average return, the following Monday will have higher average return as well. According to Jaffe *et al.* (1989), negative returns on Monday exist (disappear) when the previous week's returns are negative (positive) in Standard and Poor's index. In addition, the twist-of-the-Monday effect is found by Aggrawal and Tandom (1994) and Aggarwal and Leal (1996) in the Brazilian stock market. In the same context, Madureira and Leal (2001) and Fajardo and Ferreira (2008) also confirmed the twist-of-the-Monday effect in the Brazilian stock market.

However, there is generally lack of research on this important theme in the ASEAN-5 stock markets. Therefore, the purpose of this paper is to examine the twist-of-the-Monday² effect in the ASEAN-5 stock markets. This study differs from the previous

¹ Among others, Ho and Kok (1995), Hui (2005) and Chukwuogor (2006) employed the non-parametric methods and found inconsistent day-of-the-week effects. However, these studies did not take into consideration of the direction of the stock returns (Madureira and Leal, 2001).

² The influence of positive and negative previous week returns to the following Monday returns is the main focus in this study. The direction of market is an important variable in determining the existence of day-of-

studies mentioned above, where we focus on the stock markets of ASEAN-5 (Indonesia, Malaysia, Singapore, Thailand and the Philippines). Confirmation of this anomaly would add some value to the literature since these markets have not been previously investigated³.

2. Data and Econometric Methodology

This study employed the daily closing values of the Indonesia, Malaysia, Singapore, Thailand and the Philippines stock markets from June 10, 2002 through August 21, 2009. The use of daily data makes it possible to examine the relationship between the changes of stock prices from one trading day to the next and over weekends. If there was a non-trading day (due to holiday) on a week, the corresponding returns for the whole week were excluded from the sample. This approach is used to avoid possible influence of the holiday effect. Daily percentage change or return is calculated as below:

$$R_t = \ln\left(\frac{I_t}{I_{t-1}}\right) \times 100 \quad (1)$$

where I_t and R_t refer to price and return of the stock indices on day t , respectively.

Day-of-the-week effect

In this study, we employed the non-parametric⁴ Kruskal-Wallis statistic test to examine possible differences between the daily return in a week. The null hypothesis is that there is no difference in the returns across the days of the week. The statistic test equation is shown as below:

$$Kruskal - Wallis = \frac{12}{n(n+1)} \sum_{i=1}^k \frac{R_i^2}{n_i} - 3(n+1) \quad (2)$$

where n is the total number of sample observations, n_i is the sample sizes in i trading day, k is the number of trading days' return ($k = 5$), and R_i is the rank sum of the i trading day.

the-week effect. Understanding the direction of the market will be helpful to the market practitioners in developing investment strategies. Therefore, this study has not only given insight into the day-of-the-week effect but also help explain the relation of Monday return with previous week's returns.

³ In the study of twist-of-the-Monday effect, Lim *et al.* (2010) found significant evidence in Kuala Lumpur Composite Index for the period from May 2000 to June 2006. However, this study only focused on Malaysia, one of the ASEAN-5 stock market.

⁴ Non-parametric statistics are distribution free methods. Non-parametric methods, for instance, Kruskal-Wallis and Wilcoxon Rank Sum test, are widely used for studying populations that take on a ranked order. These tests do not rely on assumptions that the data are drawn from a given probability distribution, such as normal distribution. Non-parametric tests have been demonstrated to be almost as powerful as parametric tests in detecting differences between samples. When parametric test assumptions are not met, nonparametric tests are more robust (Kunkel *et al.*, 2003). Moreover, the null hypothesis of normal distribution is rejected in this study (not reported here) and this indicates that the distribution of the returns for each day is not normal. Therefore, the absence of normality supports the use of non-parametric methods in this study.

For large sample size, the test statistic of Kruskal-Wallis will follow the chi-square, χ^2 distribution with $(k - 1)$ degrees of freedom.

If the null hypothesis of the Kruskal-Wallis test is rejected, this implies that there is a day-of-the-week effect. Then, the Wilcoxon rank sum test is performed to find out which two trading days' return are different that contribute to the rejection of the null hypothesis of the Kruskal-Wallis test. The test is conducted by comparing the return of one trading day with those of the rest of the week by using rank-transformed data (Hui, 2005). The null hypothesis of this test is that the central locations, and thus the median, of the two samples distribution are the same. In our case, we have ten pairs of group for each stock market. For instance, in the case of Malaysia, a pair-wise comparison between the return on Monday and the return on Tuesday is first conducted and a Z-statistic is obtained. The remaining nine pairs of group are tested similarly.

The Wilcoxon rank sum test compares the central locations of two independent random samples. The two samples are pooled together and the observations are ranked in ascending order, with ties assigned the average of the next available ranks. The test statistic approaches the normal distribution as the number of sample observations increases. The Wilcoxon rank sum has the mean:

$$E(T) = \mu_T = \frac{n_1(n_1 + n_2 + 1)}{2} \quad (3)$$

and variance:

$$\text{Var}(T) = \sigma_T^2 = \frac{n_1 n_2 (n_1 + n_2 + 1)}{2} \quad (4)$$

where n_1 is the number of observations from the first sample and n_2 is the number of observations from the second. Then the distribution is approximated by the normal distribution as following:

$$Z = \frac{T - \mu_T}{\sigma_T} \quad (5)$$

where T denotes the sum of ranks of the observations from the first sample (Newbold *et al.*, 2003).

Twist-of-the-Monday effect

The sample of Monday returns is divided into two and two sub-samples are identified, one corresponding to positive previous week returns and the other to negative previous week returns. Previous week returns are calculated from the closing of Monday to the Friday close in that week (Madureira and Leal, 2001). The Wilcoxon rank sum test is used to verify the significance of the difference between the returns of the two sub-

samples. The rejection of null hypothesis for the tests indicates that the two sub-samples are significantly different and there is a twist-of-the-Monday effect.

3. Empirical Result

The mean return, median return and standard deviation for each day of the week for the five stock indices are presented in Table 1. The mean return and median return are all negative on Monday, except Singapore. Only Singapore has a positive median return on Monday, but it is the lowest return in a week. On the other hand, positive returns on Friday are found in all of the markets. These statistical values indicate the existence of day-of-the-week effect in the markets, where Monday mean return is abnormally low while Friday mean return is positive and generally the highest in a week.

Table 1 Statistic Descriptive

Country	Monday	Tuesday	Wednesday	Thursday	Friday
Indonesia					
Mean	-0.1498	0.0004	0.1330	0.1112	0.2994
Median	-0.0186	0.1218	0.1611	0.1671	0.3173
Standard Deviation	2.8080	1.9072	2.1400	2.0600	1.8939
Malaysia					
Mean	-0.0799	-0.0092	-0.0462	0.0439	0.1093
Median	-0.0210	-0.0526	0.0094	0.0551	0.0896
Standard Deviation	1.2983	0.9086	1.0614	1.0432	0.9761
Singapore					
Mean	-0.0758	0.0161	0.0745	0.0154	0.0561
Median	0.0171	0.0260	0.1065	0.0346	0.1298
Standard Deviation	1.8056	1.3667	1.4897	1.5183	1.4235
Thailand					
Mean	-0.1593	-0.0242	0.0175	0.0892	0.3304
Median	-0.1001	-0.0906	-0.0387	0.0725	0.3034
Standard Deviation	2.1284	1.8788	1.7538	1.6149	1.6880
The Philippines					
Mean	-0.0604	-0.0466	0.0750	0.1369	0.0762
Median	-0.0400	0.0305	0.0838	0.1744	0.1173
Standard Deviation	1.8465	1.6837	1.7095	1.6675	1.6283

Day-of-the-week effect

Table 2 shows the result of the Kruskal-Wallis test. The rejection of the null hypothesis leads to the conclusion that there is evidence of day-of-the-week effect. Among the five countries, the value of the chi-square is significant at the 5% level for the Malaysian stock market and at the 1% level for the Thailand stock market. The result reveals that the day-of-the-week effect only appears in Malaysia and Thailand. Besides, the results of no day-of-the-week effect in the Singapore, Indonesia and the Philippines stock markets indicate that these markets are efficient in past price and volume information and thus stock movements cannot be predicted using this historical information. Next, the Wilcoxon rank sum test identified those trading days that contribute to the rejection of the null hypothesis of the Kruskal-Wallis test in these two stock markets.

Table 2 Kruskal-Wallis Test

Country	Chi-square Statistics	Null Hypothesis
Indonesia	6.0102	Accept
Malaysia	7.6196	Reject at the 10 percent level
Singapore	2.3102	Accept
Thailand	19.4204	Reject at the 1 percent level
Philippines	6.4028	Accept

Notes: Reject the null hypothesis of no day of the week effect if computed chi-square statistic exceeds the critical value with four degree of freedom.

Since Malaysia and Thailand stock markets show evidence of day-of-the-week effects, we only conduct the test on these two stock markets. In the case of Malaysia, the result from Table 3 indicates that the difference in returns is significant when Monday is compared with Thursday (10% level) and Friday (5% level). This implies that Monday has significantly lower returns compared to Thursday and Friday returns. Tuesday and Wednesday returns are also significantly lower than Friday returns. In Thailand, as expected, Friday has the highest returns in a week and this is significantly different compared with other days.

Table 3 Wilcoxon Rank Sum Test

Malaysia	Z-test Statistic	Null Hypothesis
<u>Pairs of trading days</u>		
Monday – Tuesday	-0.4661	Accept
Monday – Wednesday	-0.4475	Accept
Monday – Thursday	-1.7067	Reject at the 10 percent level
Monday – Friday	-2.2822	Reject at the 5 percent level
Tuesday – Wednesday	-0.0214	Accept
Tuesday – Thursday	-1.2254	Accept
Tuesday – Friday	-2.0192	Reject at the 5 percent level
Wednesday – Thursday	-1.1759	Accept
Wednesday – Friday	-1.8097	Reject at the 10 percent level
Thursday – Friday	-0.5394	Accept
<u>Thailand</u>		
<u>Pairs of trading days</u>		
Monday – Tuesday	-1.0394	Accept
Monday – Wednesday	-1.4336	Accept
Monday – Thursday	-1.9480	Reject at the 5 percent level
Monday – Friday	-4.1489	Reject at the 1 percent level
Tuesday – Wednesday	-0.4352	Accept
Tuesday – Thursday	-0.8714	Accept
Tuesday – Friday	-3.2268	Reject at the 1 percent level
Wednesday – Thursday	-0.4764	Accept
Wednesday – Friday	-2.7833	Reject at the 1 percent level
Thursday – Friday	-2.2447	Reject at the 5 percent level

Notes: Reject the null hypothesis of no difference between the two sub-samples if computed Z-statistic is less than the critical value of the standard normal distribution. ***, ** and * indicate the rejection of null hypothesis at the 10, 5 and 1% significance level.

Twist-of-the-Monday effect

Table 4 summarizes the finding of the twist of the Monday effect of the five stock indices. The finding suggests that the Monday returns are strongly influenced by previous week returns in three out of five markets, namely Indonesia, Malaysia and the Philippines. Monday returns following weeks of negative returns have a negative median return while its returns is positive following weeks of positive returns. In other words, the result clearly shows that there is a twist-of-the-Monday effect in these three stock markets.

The twist-of-the-Monday effect was not found in Singapore and Thailand stock markets. Surprisingly, in Singapore, the Wilcoxon rank sum test indicated that the two sub-samples of Tuesday returns are significantly different at the 1% level. However, there is some evidence showing that the returns of other days in a week are influenced by the preceding week. In Indonesia, the result shows that the two sub-samples of Thursday returns are only significantly different at the 10% level. Besides, the Philippines sub-samples on Tuesday and Friday also show significant result at the 10% level.

Table 4 Median day of the week returns following positive or negative previous week returns

Country	Median Return				
	Monday	Tuesday	Wednesday	Thursday	Friday
Indonesia					
Previous Week Positive	0.1142	0.1408	0.0458	0.0943	0.2193
Previous Week Negative	-0.3359	0.1205	0.1801	0.2103	0.2747
Z-test Statistic	-2.8318*	-0.4028	-0.5463	-1.6446***	-0.5969
Malaysia					
Previous Week Positive	0.0704	-0.0359	-0.0335	0.1136	0.1112
Previous Week Negative	-0.1851	-0.0610	0.0251	0.0913	0.1160
Z-test Statistic	-2.6822*	-0.6779	-0.0750	-0.1053	-0.0148
Singapore					
Previous Week Positive	-0.0176	-0.0126	0.1275	0.0644	0.1052
Previous Week Negative	0.0171	0.2201	0.0416	0.0291	0.1298
Z-test Statistic	-0.8675	-2.0881**	-0.8765	-0.9354	-0.5246
Thailand					
Previous Week Positive	-0.0498	-0.0614	-0.0494	0.0325	0.3084
Previous Week Negative	-0.1816	-0.0181	-0.0658	0.1728	0.2710
Z-test Statistic	-1.4695	-0.7448	-0.3727	-0.8657	-0.3332
The Philippines					
Previous Week Positive	0.0672	-0.2327	0.1025	0.1215	0.0312
Previous Week Negative	-0.2794	0.1469	0.0644	0.3670	0.2068
Z-test Statistic	-2.7418*	-1.7203***	-0.2988	-0.5802	-1.7118***

Notes: Reject the null hypothesis of no difference between the two sub-samples if computed Z-statistic is less than the critical value of the standard normal distribution. ***, ** and * indicate the rejection of null hypothesis at the 10, 5 and 1% significance level.

4. Conclusion

This study examines the day-of-the-week effect and the twist-of-the-Monday effect for the ASEAN – 5 stock markets for the period June 10, 2002 through August 21, 2009. The non-parametric test, the Kruskal-Wallis statistic test and the Wilcoxon Rank Sum test have detected differences between samples in this study. In particular, the Kruskal-Wallis statistic test found evidence for the day-of-the-week effect in the Malaysian and Thailand stock markets. In addition, the Wilcoxon Rank Sum Test showed that Monday has significantly lower returns compared to Thursday and Friday returns in the Malaysian stock market. On the other hand, Friday has the highest returns in a week and this is significantly different compared with other days in Thailand stock market. This study also found evidence on the twist-of-the-Monday effect, where returns on Mondays are influenced by the previous week's returns in the Indonesia, Malaysia and the Philippines stock markets. Thus, international investors can benefit from the day-of-the-week and the twist-of-the-Monday effect in developing a suitable trading strategy to obtain extra returns from these markets.

References

Aggarwal, R. and Leal, R. (1996) Integration and Anomalies in the Emerging Markets of Asia and Latin America. In: J. Doukas and L. Lang (Eds.), *Research in International Business and Finance*, (Supplement 1, 75 – 99), Greenwich, CT: Jai Press.

Aggarwal, A. and Tandon, K. (1994) Anomalies or Illusions? Evidence from Stock Markets in Eighteen Countries, *Journal of International Money and Finance*, 13, 83 – 106.

Alexakis, P. and Xanthakis, M. (1995) Day Of The Week Effect on the Greek Stock Market, *Applied Financial Economics*, 5, 43 – 50.

Apolinario, R. M. C., Santana, O. M., Sales, L. J. and Caro, A. R. (2006) Day Of The Week Effect on European Stock Markets, *International Research Journal of Finance and Economics*, 2, 53 – 70.

Arsad, Z. and Coutts, J. A. (1996) The Weekend Effect, Good News, Bad News and The Financial Times Industrial Ordinary Shares Index: 1935 – 9, *Applied Economics Letters*, 3, 797 – 801.

Brooks, C. and Persaud, G. (2001) Seasonality in Southeast Asian Stock Markets: Some New Evidence on Day-Of-The-Week Effects, *Applied Economics Letters*, 8, 155 – 158.

Connolly, R. A. (1989) An Examination of the Robustness of the Weekend Effects, *Journal of Financial and Quantitative Analysis*, 24, 133 – 169.

Fama, E. (1970) Efficient Capital Markets: A Review of the Theory and Empirical Work, *Journal of Finance*, 25, 383 – 417.

Fajardo, J. and Ferreira, R. (2008) Seasonal Effect on the Bovespa Index, *Brazilian Business Review*, 5, 233 – 241.

Gibbons, M. and Hess, P. (1981) Day of the Week Effects and Asset Returns, *Journal of Business*, 54, 579 – 596.

Ho, P. C. and Kok, K. L. (1995) Day-Of-The-Week Effect of the Malaysian Second Board Stock Market, *Malaysian Management Review*, 1 – 10.

Hui, T. K. (2005) Day-Of-The-Week Effects in US and Asia-Pacific Stock Markets During the Asian Financial Crisis: A Non-Parametric Approach, *The international Journal of Management Science*, 33, 277 – 282.

Jaffe, J. and Westerfield, R. (1985) The Week-End Effect in Common Stock Returns: The International Evidence, *Journal of Finance*, 40, 433 – 454.

Jaffe, J., and Westerfield, R. and Ma, C. (1989) A Twist on the Monday Effect in Stock Prices: Evidence from the US and Foreign Stock Markets, *Journal of Banking and Finance*, 13, 641 – 650.

Keim, D. and Stambaugh, R. (1984) A Further Investigation of the Week-End Effect in Stock Returns, *Journal of Finance*, 39, 819 – 835.

Kunkel, R. A., Compton, W. S. and Beyer, S. (2003) The Turn-Of-The-Month Effect Still Lives: The International Evidence, *International Review of Financial Analysis*, 12, 207 – 221.

Lakonishok, H. J. and Levi, M. (1982) Week-End Effects on Stock Returns: A Note, *Journal of Finance*, 37, 883 – 889.

Lakonishok, H. J. and Smidt, S. (1988) Are Seasonal Anomalies Real? A Ninety Year Perspective, *Review of Financial Studies*, 1, 403 – 425.

Lakonishok, H. J. and Maberly, E. (1990) The Weekend Effect: Trading Patterns of Individual and Institutional Investors, *Journal of Finance*, 45, 231 – 243.

Lim, S. Y., Ho, C. M. and Dollery, B. E. (2010) An Empirical Analysis of Calendar Anomalies in the Malaysian Stock Market, *Applied Financial Economics*, 20, 255 – 264

Madureira, L. L. and Leal, R. P. C. (2001) Elusive Anomalies in the Brazilian Stock Market, *International Review of Financial Analysis*, 10, 123 – 134.

Newbold, P., Carlson, W. L. and Thorne, B. (2003) Nonparametric Statistics, in *Statistics for business and economics* (eds) Tucker, T., Boardman, P. J., Rusnak, E. and Lee, J., 5th ed, Prentice Hall, New York, 531 – 555.

Pena, J. I. (1995) Daily Seasonalities and Stock Market Reform in Spain, *Applied Financial Economics*, 5, 419 – 423.

Solnik, B. and Bousquet, L. (1990) Day of the Week Effect on the Paris Bourse, *Journal of Banking and Finance*, 14, 461 – 468.