

CHAPTER 4

EMPIRICAL RESULTS AND ANALYSIS

Chapter 4 reports the findings obtained from the various statistical tests conducted and provides analysis based on the findings. The reporting format is according to the layout as stated in *Research Methodology* of Chapter 3.

4.1 MEANS AND VARIANCES ON PRE- AND POST-HOLIDAYS

The total trading days are divided into three subsets: the trading days immediately before holidays (pre-holidays), the trading days immediately after holidays (post-holidays), and the remaining ordinary trading days. The means and variances of the three stock indices for these three sets of days were calculated and are reported in Table 3(A), along with a t-statistic for the difference of the means.

The results from Table 3A show that there is a strong pre-holiday effect in the KLSE as demonstrated by the significantly high mean returns, which range from 0.348% to 0.428%, on the trading days before holidays for all three indices. The results are also in common with the findings of Ariel (1990) and Barone (1990) whereby, despite the much higher return, the variance of pre-holiday return is lower than the variance of ordinary day return. Contrary to the pre-holiday returns, the results show that the post-holiday returns for all three indices are larger and more volatile than the ordinary day returns; however, the results are insignificant.

Table 3

Panel A: Means and Variances

KLSE Indices	Market	<u>CI</u>	<u>EMI</u>	<u>SBI</u>
Sample Period		Jan'90 - Jun'00	Oct'91 - Jun'00	Oct'91 - Jun'00
Ordinary Day*				
Mean, %		-0.0121	-0.0091	0.0017
Variance		3.1354	3.3259	5.1081
Number of Days		2357	1954	1954
Pre-Holiday				
Mean, %		0.3483	0.4275	0.4071
Variance		1.4249	1.3294	2.6611
Number of Days		112	91	91
t-statistic ^a		2.131*	2.263*	1.690**
Post-Holiday				
Mean, %		0.2189	0.1522	0.0794
Variance		8.4106	8.1140	6.7159
Number of Days		113	92	92
t-statistic ^b		-0.839	-0.538	-0.320

Source: Appendix 2

*Excluding pre-holiday, post-holiday, and missing values.

^aThe t-statistic tests the equality between the mean return of pre-holiday and the mean return on ordinary days.^bThe t-statistic tests the equality between the mean return of post-holiday and the mean return on ordinary days.

* Significant at 5% level

**Significant at 10% level

Panel B: Frequency of Positive Return Days

KLSE Market Indices	<u>CI</u>	<u>EMI</u>	<u>SBI</u>
Sample Period	Jan'90 - Jun'00	Oct'91 - Jun'00	Oct'91 - Jun'00
Total			
All Trading Days*	2594	2148	2148
Pre-holidays	112	91	91
Post-holidays	113	92	92
Positive return days among the total trading days (fraction positive days)	1300 (0.5012)	1076 (0.5009)	1031 (0.4800)
Positive return days among the pre-holidays (fraction positive days)	73 (0.6518)	61 (0.6703)	55 (0.6044)
X ² -statistic ^a (Pre-holidays)	10.1413*	10.4259*	5.8693**
Implied p^b (Pre-holidays)	0.0014	0.0012	0.0154
Positive return days among the post-holidays (fraction positive days)	60 (0.5310)	42 (0.4565)	40 (0.4348)
X ² -statistic ^a (Post-holidays)	0.4009	0.7244	0.7832
Implied p^b (Post-holidays)	0.5266	0.3947	0.3762

*Including pre-holiday, post-holiday, and missing values.

Source: Appendix 3

^aLetting O represent the observed number of positive return pre-holidays (post-holidays) and E represent the expected number of positive pre-holidays (post-holidays) on the null hypothesis that pre-holidays (post-holidays) are random draws from the global sample, the X²-statistic is calculated as: $X^2 = 2(O-E)^2/E$. For e.g., there are 73 observed positive return pre-holidays. The expected number of positive return pre-holidays on the null hypothesis is the global fraction of positive return days (0.5012) times the 112 pre-holidays in the sample for the KLSE CI.

^bImplied p is calculated by Microsoft Excel Statistical function: Chi-squared distribution (x , deg_freedom) where x is the calculated value from the X²-statistic and degree of freedom in all cases is 1.

*Significant at 1% level

**Significant at 5% level

The t-statistic reported in Table 3(A) above assumes independence of the returns in the three sub-sets of days. A nonparametric test less sensitive to this assumption is performed by assuming the number of pre-holidays (post-holidays) are merely selected randomly from the total trading days in the full period. Table 3(B) reports the χ^2 -statistic testing the null hypothesis that the expected frequency of positive return days among the pre-holidays (post-holidays) equals the realised frequency of positive return days among all trading days in the period. For all three indices, the resulting test rejects the hypothesis (at 1% for KLSE CI and KLSE EMI; at 5% for KLSE SBI) of equal positive return frequencies in the two groups of days in favour of the alternative hypothesis of more frequent pre-holiday advances. However, the test for post-holidays indicates that the expected frequency of positive return days among the post-holidays equals the realised frequency of positive return days among all trading days in the period. This implies that post-holiday effect is insignificant in the KLSE. The results obtained from the non-parametric tests are consistent with those of the parametric tests.

4.2 STOCK RETURNS ON DAYS AROUND HOLIDAYS

The OLS Multiple Regression Model using Equation 2, whereby daily mean return is a sum of regression constant and its respective regression coefficient, exhibits an insignificant F-value. ANOVA for the regression model of all three indices using F-statistic is insignificant at 5% level; this merely means that the regression model is unable to provide any predictive power for the daily stock returns. This is because the return is solely concentrated on the first day before holiday and not on other days. Results of the regression and individual t-statistic for the regression coefficients which determines if each coefficient is significantly different from zero are presented in Table 4.

Table 4

Mean Returns on Days Around Holidays

KLSE Market Indices	<u>CI</u>	<u>EMI</u>	<u>SBI</u>
Sample Period	Jan'90 - Jun'00	Oct'91 - Jun'00	Oct'91 - Jun'00
Analysis of Variance F-statistic	1.809	1.457	0.991
Second day before holiday Mean, % t-statistic	0.048 0.415	-0.086 -0.373	-0.208 -0.932
First day before holiday Mean, % t-statistic	0.348 2.125*	0.428 2.198*	0.407 1.607**
First day after holiday Mean, % t-statistic	0.219 1.395	0.152 0.822	0.079 0.255
Second day after holiday Mean, % t-statistic	0.181 1.174	0.107 0.589	-0.106 -0.513
Normal trading days Mean, % t-statistic	-0.025 -0.646	-0.011 -0.251	0.018 0.336

* Significant at 5%

**Significant at 10%

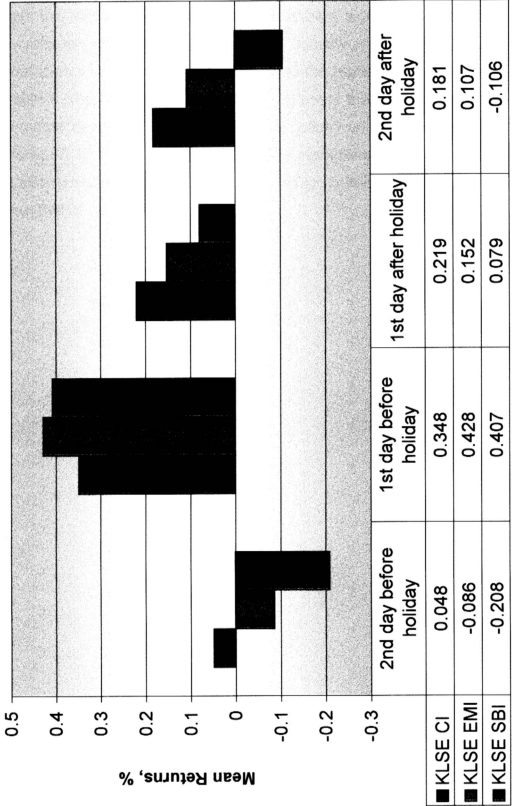
Source: Appendix 4

Results indicate that high returns predominate only on the single trading day before holidays and not on other days around holidays. Both the KLSE CI and KLSE EMI record a significantly high return on the first day prior to holiday at 5% level. The KLSE SBI, however, only shows a marginal significance at 10% level whereby its mean return for the first day before holiday is about 22 times higher than that of the normal trading days' mean return. In addition, the returns for the first day immediately

after holiday are higher for all three indices, although the results are insignificant.

Figure 5 graphically depicts the mean returns on the four trading days surrounding holidays.

Figure 5
Mean Returns on Days Around Holidays



4.3 HOLIDAY EFFECT BY INDIVIDUAL HOLIDAY

The OLS multiple regression models using Equation (3) show significant results for two indices. ANOVA for the regression model of the KLSE CI and the KLSE EMI using F-statistic exhibit significance at 1% level; thereby rejecting the null hypothesis of equality among all the regression coefficients for these indices. Results of the regression are presented in Table 5 where Panel (A), (B), and (C) present the mean returns and the standard deviations for each individual holiday and the ordinary days for the KLSE CI, KLSE EMI, and KLSE SBI, respectively. Individual t-statistic is also exhibited to show if each pre-holiday (post-holiday) return is higher than that of ordinary days.

Table 5

Holiday Effect by Individual Holiday

**PANEL A: KLSE CI
(Jan 1990 – Jun 2000)**

	Pre-holiday			Post-holiday		
	Mean	σ	t-stat. ^a	Mean	σ	t-stat. ^a
NYD	0.984	1.103	1.833**	-0.647	2.101	-1.169
CNY	0.866	0.574	1.319	2.825	6.246	1.837**
HRP	0.687	0.881	0.931	2.432	6.803	0.543
LABOR	0.712	1.050	1.137	0.028	0.795	0.073
WESAK	0.095	0.992	0.178	0.463	1.426	0.875
HRQ	0.070	0.796	0.152	0.569	0.818	0.913
AM	0.702	1.728	1.315	0.095	1.264	0.188
NATIONAL	0.107	1.723	0.188	-1.551	4.963	-2.561*
MR	-0.502	0.862	-0.859	-0.234	2.007	-0.388
DEEPA	0.084	1.392	0.168	0.302	2.412	0.552
XMAS	0.330	1.034	0.601	0.439	0.945	0.793
KONGSI	0.969	0.842	-0.329	7.272	11.741	4.119*
ELECTION	-0.559	1.696	-0.526	-0.814	1.380	-0.772
ORDINARY DAY	-0.012		-0.334	-0.012		-0.334
ANOVA						
F-statistic			2.887 ⁺			

* Significant at 1%

* Significant at 5% level

** Significant at 10% level

Source: Appendix 5

Regression results for the KLSE CI from Panel A show that mean returns for the first day before New Year's Day is statistically different from ordinary days' mean return at the 10% level. Significantly strong post-holiday returns are reported for the Chinese New Year and Kongs Raya holidays at 10% and 5% level respectively.

The significantly negative post-National Day return is a sole effect of capital control. The imposition of the capital control on September 1, 1998 (which is a trading day immediately after the National Day) by the Malaysian government has seen a sharp decline in the stock market whereby the KLSE CI recorded a historical low of 262.70 points on that day. As such, if this day is omitted from the study, the post-National Day return will be an insignificant positive figure.

The F-statistic that all the holiday effects equal to zero is 2.887, leading to a rejection of the null hypothesis at the 1% level.

PANEL B: KLSE EMI
(Oct 1991 – Jun 2000)

	Pre-holiday			Post-holiday		
	Mean	σ	t-stat. ^a	Mean	σ	t-stat. ^a
NYD	0.913	0.888	1.501	-0.582	2.222	-0.928
CNY	1.133	0.594	1.570	2.936	6.321	1.456
HRP	0.899	0.938	1.104	2.249	6.566	0.089
LABOR	0.818	0.952	1.188	-0.133	0.996	-0.199
WESAK	-0.143	1.027	-0.190	0.481	1.558	0.799
HRQ	0.141	0.981	0.246	0.828	0.677	1.113
AM	0.984	1.955	1.617	0.256	1.478	0.409
NATIONAL	-0.461	1.345	-0.598	-1.535	4.208	-2.186*
MR	-0.096	0.553	-0.131	-0.569	1.729	-0.855
DEEPA	0.318	1.130	0.534	0.138	2.438	0.241
XMAS	0.158	1.067	0.274	0.251	0.883	0.426
KONGSI	1.054	0.694	-0.631	6.636	10.542	3.645*
ELECTION	0.271	0.910	0.216	-1.685	0.214	-1.285
ORDINARY DAY	-0.011		-0.256	-0.011		-0.256
ANOVA						
F-statistic			2.423*			

* Significant at 1%

* Significant at 5% level

Source: Appendix 5

Regression results for the KLSE EMI as reported in Panel B are similar to part of the findings obtained for the KLSE CI whereby the Kongs Raya holiday's post-holiday returns is statistically different from the ordinary days' mean return at the 5% level. The post-National Day returns have already been explained earlier. The F-statistic that all the holiday effects

equal to zero is 2.423, leading to a rejection of the null hypothesis at the 1% level.

**PANEL C: KLSE SBI
(Oct 1991 – Jun 2000)**

	Pre-holiday			Post-holiday		
	Mean	σ	t-stat. ^a	Mean	σ	t-stat. ^a
NYD	0.448	1.197	0.595	0.060	3.776	0.080
CNY	1.895	2.087	1.804**	1.839	4.197	1.665**
HRP	1.391	1.120	0.983	1.203	3.269	0.631
LABOR	0.997	1.141	1.167	-0.707	0.884	-0.937
WESAK	-0.169	1.609	-0.198	-0.031	2.930	-0.041
HRQ	0.393	2.223	0.522	0.775	1.172	0.840
AM	0.350	1.998	0.464	-0.480	2.139	-0.600
NATIONAL	-0.463	1.507	-0.501	0.315	1.833	0.369
MR	-0.053	0.604	-0.066	0.136	2.993	0.171
DEEPA	0.523	1.527	0.695	-0.123	2.530	-0.163
XMAS	-0.399	1.763	-0.529	-0.418	2.139	-0.555
KONGSI	2.358	1.407	-0.115	2.446	5.793	0.178
ELECTION	0.058	0.455	0.036	-1.106	0.105	-0.693
ORDINARY DAY	0.000		-0.004	0.000		-0.004
ANOVA - F-statistic			0.778			

**Significant at 10% level

Source: Appendix 5

The KLSE SBI, on the other hand, displays a unique set of regression results whereby the holiday effect for these Second Board stocks is totally concentrated on Chinese New Year. The pre- and post-Chinese New Year returns (pre-CNY: 1.895%; post-CNY: 1.839%) are statistically significant at the 10% level.

4.4 PRE-HOLIDAY RETURNS NOT A MANIFESTATION OF OTHER CALENDAR ANOMALIES

Results of regressing the KLSE CI, the KLSE EMI and the KLSE SBI against one or more dummy variables are reported in Table 6. Panel A reports the regression of returns against pre-holiday dummy only. Panel B to E report the results for the regression models after isolating from the January effect, day-of-the-week effect, monthly effect, and small firm size effect, respectively. The figures in first row are the regression coefficients stated in percent returns per day while the figures in parentheses are the t-statistic. The significance of t-statistic for the pre-holiday dummy variable confirms the existence of pre-holiday effect.

Table 6

**Pre-Holiday Returns Not A Manifestation of
Other Calendar Anomalies**

Panel A: Pre-Holiday Strength
(CI: Jan 1990 – Jun 2000; EMI: Oct 1991 – Jun 2000)

$R_i =$	a_i	+ Pre-Holiday
CI =	-0.002 (-0.042)	+ 0.350 (1.996)*
EMI =	-0.002 (-0.044)	+ 0.429 (2.159)*

*Significant at 5% level

Source: Appendix 6

Panel A shows that the coefficients for the KLSE CI and the KLSE EMI's pre-holiday dummy variables are significantly positive at 5% level, indicating that the returns on pre-holidays are significantly different from the ordinary days' returns.

Panel B: Pre-Holiday Strength Not Caused by January Effect
(CI: Jan 1990 – Jun 2000; EMI: Oct 1991 – Jun 2000)

$R_i =$	a_i	+ Pre-Holiday	+ Jan
CI =	0.004 (0.114)	+0.349 (1.993)*	-0.069 (-0.537)
EMI =	0.007 (0.159)	+0.429 (2.156)*	-0.104 (-0.715)

*Significant at 5% level

Source: Appendix 6

Panel B reports the regression model which attempts to isolate the January effect by excluding all the days in January. Results indicate that for both indices, the pre-holiday dummies remain large and statistically

significant at 5% level, even in the presence of the separate January dummy. This implies that the pre-holiday effect is not caused by the January effect.

Panel C: Pre-Holiday Strength Not Caused by Day-of-the-Week Effect
(CI: Jan 1990 – Jun 2000; EMI: Oct 1991 – Jun 2000)

$R_i =$	a_i	+Mon	+Tue	+Wed	+Thu	+Fri	+Pre-hol
<u>(I) Isolation from Monday</u>							
CI =	0.045 (1.113)	-0.236 (-2.608)*					+0.324 (1.848)**
EMI =	0.064 (1.405)	-0.333 (-3.270) [@]					+0.385 (1.938)*

<u>(II) Isolation from Tuesday</u>							
CI =	-0.004 (-0.093)		+0.011 (0.122)				+0.351 (1.998)*
EMI =	0.001 (0.026)		-0.015 (-0.147)				+0.428 (2.153)*

<u>(III) Isolation from Wednesday</u>							
CI =	-0.024 (-0.589)			+0.111 (1.242)			+0.355 (2.027)*
EMI =	-0.033 (-0.728)			+0.156 (1.554)			+0.435 (2.189)*

<u>(IV) Isolation from Thursday</u>							
CI =	0.008 (0.197)				-0.047 (-0.526)		+0.346 (1.972)*
EMI =	0.015 (0.317)				-0.080 (-0.798)		+0.423 (2.123)*

$R_i =$	a_i	+Mon	+Tue	+Wed	+Thu	+Fri	+Pre-hol
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(V) Isolation from Friday

CI =	-0.031 (-0.776)					+0.157 (1.746)**	+0.302 (1.706)**
EMI =	-0.052 (-1.150)					+0.264 (2.618)*	+0.346 (1.721)**

(VI) Isolation from Monday and Friday

CI =	0.020 (0.431)	-0.210 (-2.253)*				+0.107 (1.152)	+0.295 (1.663)**
EMI =	0.017 (0.335)	-0.286 (-2.723)*				+0.196 (1.894)**	+0.330 (1.641)**

@Significant at 1% level

*Significant at 5% level

**Significant at 10% level

Source: Appendix 6

Panel C reports the regression results after isolating from the day-of-the-week effect. Each individual day is regressed against the stock indices together with the pre-holiday dummy, except in Part 6 where both Monday and Friday are regressed simultaneously. Results show that the pre-holiday effect is not caused by the day-of-the-week effect as the pre-holiday dummies remain significantly positive after correcting for the different days of the week.

Panel D: Pre-Holiday Strength Not Caused by Monthly Effect
(CI: Jan 1990 – Jun 2000; EMI: Oct 1991 – Jun 2000)

$R_i =$	a_i	+ Pre-Holiday	+ TOM
CI =	-0.062 (-0.122)	+0.352 (1.999)*	+0.009 (0.130)
EMI =	-0.034 (-0.586)	+0.442 (2.214)*	+0.064 (0.793)

*Significant at 5% level

Source: Appendix 6

Panel D shows that the pre-holiday strength is not caused by the monthly effect. This is proven by the fact that the incremental return earned on the turn-of-month dummy is negligible for both indices and the pre-holiday dummy remains large and statistically significant.

**Panel E: No Incremental Small Firm Pre-Holiday Premium
(SBI: Oct 1991 – Jun 2000)**

R _{SBI} =	a _i	+Mon	+Fri	+Pre-hol	+Jan	+TOM
	0.005 (0.104)			+0.402 (1.666)**		
	0.010 (0.198)			+0.402 (1.664)**	-0.061 (-0.347)	
	-0.089 (-1.284)			+0.438 (1.812)**		+0.190 (1.942)*
	-0.019 (-0.303)	-0.237 (-1.860)**	+0.374 (2.973) [@]	+0.253 (1.037)		

[@]Significant at 1% level

*Significant at 5% level

**Significant at 10% level

Source: Appendix 6

The first model in Panel E shows that a premium of 0.402% accrues on pre-holidays for the KLSE SBI. The pre-holiday dummy remains significant after adding the January dummy in the second model and the turn-of-the month dummy in the third model. However, after correcting the day-of-the-week effect in the fourth model, the incremental KLSE SBI pre-holiday return falls to an insignificant 0.253%. In short, there is no evidence of an incremental return accruing to small firms that is solely attributed to the holiday effect.

4.5 RELATIONSHIP BETWEEN BUSINESS CYCLES AND PRE-HOLIDAY EFFECT FOR DIFFERENT FIRM SIZES

Table 7 reports the regression results, Durbin-Watson (D-W), and K-W results for the KLSE CI, the KLSE EMI, and the KLSE SBI during various business cycles. Panel A reports the regression of stock returns against pre-holiday dummy for the entire period, Panel B covers expansionary period, Panel C covers recession period, and Panel D covers recovery period. The figures in first row are the coefficients stated in percent returns per day while those in parentheses are the t-statistic.

Table 7
Business Cycles and the Pre-holiday Effect

Panel A: Entire Period (CI: Jan 1990 - Jun 2000; EMI & SBI: Oct 1991 - Jun 2000)				
	α_{ij1}	α_{ij2}	D-W	K-W
CI	-0.0015 (-0.042)	0.3500 (1.996)**	1.856	10.822*
EMI	-0.0018 (-0.044)	0.4290 (2.159)**	1.833	11.581*
SBI	0.0052 (0.104)	0.4020 (1.666)***	1.677	7.027*

*Significant at 1% level
**Significant at 5% level
*** Significant at 10% level

Source: Appendix 7

Panel A shows that the pre-holiday effect is present in all three indices throughout the entire sample period. The KLSE EMI reports the highest pre-holiday magnitude (0.4290%) against the normal day's mean (-

0.0018%). The nonparametric K-W test also rejects the hypothesis that the pre-holiday returns are equal to the ordinary day returns for all the indices.

Panel B: Expansionary Period (CI: Jan 1990 - Jun 1997; EMI & SBI: Oct 1991 - Jun 1997)				
	a_{ij1}	α_{ij2}	D-W	K-W
CI	0.0144 (0.512)	0.4500 (3.286)*	1.613	14.415*
EMI	0.0280 (0.843)	0.6140 (3.736)*	1.681	17.322*
SBI	0.0833 (1.875)***	0.4810 (2.187)**	1.663	6.392*

*Significant at 1% level
**Significant at 5% level
*** Significant at 10% level

Source: Appendix 7

Panel B shows the results from the analysis of a pre-holiday effect during expansionary period. The results for this period are similar to those from the entire period, except that the ordinary day returns are statistically different from zero at the 10% level for the KLSE SBI. Once again, the KLSE EMI exhibits the most pronounced pre-holiday effect followed by the KLSE SBI. The K-W test also rejects the hypothesis that the pre-holiday returns are equal to the ordinary day returns.

**Panel C: Recession Period
(Jul 1997 – Dec 1998)**

	α_{ij1}	α_{ij2}	D-W	K-W
CI	-0.1640 (-0.854)	-0.0514 (-0.052)	2.000	0.045
EMI	-0.1910 (-1.092)	-0.1450 (-0.161)	1.896	0.003
SBI	-0.3290 (-1.787)***	-0.3250 (-0.343)	1.564	0.139

***Significant at 10% level

Source: Appendix 7

The results from the analysis of a pre-holiday effect during recession period are reported in Panel C. Pre-holiday returns are negative and statistically insignificant for all the indices, indicating that pre-holiday effect is absent during recession period. The KLSE SBI also shows that the Second Board counters are worst hit during recession periods whereby daily ordinary day mean return is -0.329% and the result is significant at 10% level. The K-W test reconfirms the t-statistic results and accepts the null hypothesis that the pre-holiday mean returns are equal to the ordinary day mean returns.

**Panel D: Recovery Period
(Jan 1999 – Jun 2000)**

	α_{ij1}	α_{ij2}	D-W	K-W
CI	0.0845 (0.944)	0.205 (0.535)	1.766	0.678
EMI	0.0785 (0.809)	0.273 (0.657)	1.895	0.984
SBI	0.0478 (0.336)	0.653 (1.069)	1.935	2.799***

***Significant at 10% level

Source: Appendix 7

Panel D provides results for the recovery period. The pre-holiday effect is seen present again although the results are statistically insignificant, except for the KLSE SBI as shown by the K-W result. Interestingly, the KLSE SBI is leading ahead during recovery periods whereby its magnitude of pre-holiday strength during recovery periods is much higher than that from expansionary period. Therefore, pre-holiday effect is more pronounced in the Second Board than in the Main Board of the KLSE during recovery period.

In short, the patterns of the pre-holiday and ordinary day returns vary according to the level of economic activity. During periods of expansion and recovery, the ordinary day returns are mostly insignificantly positive whilst the ordinary day returns are mostly insignificant negative during recession period. The magnitude of pre-holiday effect is the highest during expansionary period and lowest during recession period, except the KLSE SBI which exhibits stronger pre-holiday returns during recovery period as compared to expansionary period.