

CHAPTER 4

ANALYSIS AND DISCUSSION OF RESULTS

4.1 Introduction

This chapter presents the findings of the research. The 48 securities chosen for the study are grouped according to listing boards and sectors. Under grouping of the listing board, the securities are divided into Main Board or Second Board, as listed in KLSE. However, Lityan, which was promoted to the Main Board during the period of study is grouped under Second Board as it was listed in the Second Board for a longer period.

For grouping of sectors, 42 securities are grouped into 6 sectors, i.e. Finance, Industrial Products, Consumer Products, Properties, Construction and lastly, Trading & Services. Due to insufficient sample size, the remaining 6 securities that do not belong to the sectors mentioned above will be ignored when analysis for sector classification is performed. The details of the grouping for all securities are shown in Appendix 3.

The analysis of this study is divided into two stages. In the first stage, the performance of returns for each security is compared for different trading techniques. In the second stage, statistical tests will be carried out. One-way ANOVA is used to analyse the differences in returns across the boards or sectors under each trading technique. Two-way ANOVA is used to analyse the differences in performance for each trading technique. If the null hypothesis of equal returns is rejected, Tukey test will be carried out to look

for treatment differences that are responsible. As ANOVA test is carried out on the returns of a group of securities, which have been classified either by boards or by sectors, the results may not reveal the real situation for individual stock investment. To overcome this shortfall, chi-square test, which is based on the number of counts will be carried out. Chi-square test compares the number of securities that produced the highest returns among the different trading techniques for each security with the expected number of securities.

4.2 Comparison of Returns for Different Trading Techniques

The returns of 48 securities are tabulated in Tables 4.1(a) and 4.1(b), by Main Board and Second Board respectively. The results illustrate that an investor obtained the highest returns on the average by using Japanese candlestick chart. As reflected in both tables, buy-and-hold strategy worked best for some securities like Bat and Tanjong. These securities have gained profit more than 10 times the capital using the buy-and-hold strategy. However, buy-and-hold strategy did not provide a satisfactory performance in general and resulted in losses for an investor for most of the securities.

The average profit margin for moving average is lower compared to Japanese candlestick chart, as shown in both tables. Besides, Japanese candlestick chart showed that it is superior with almost all of the securities showing positive returns, except Bat and Tanjong. Moving average did not perform well for some of the securities in Main Board, which have negative returns, even though the losses are minimum.

Table 4.1 (a)

**The Performance of Returns for Buy-and-Hold Strategy, Moving Average
and Japanese Candlestick Chart for 35 Securities from
KLSE's Main Board**

No	Security	BNH	EWMA	JCC
1	Affin	-49.7744	281.3323	175.7341
2	CMSB	-80.4302	68.7682	123.5762
3	Commerz	52.022	147.7003	220.1714
4	Hancock	-25.5538	-1.97946	58.8842
5	HLBank	-26.4487	124.3030	168.7861
6	OSK	-7.0268	77.3851	153.0979
7	Pacific	27.6874	100.1624	148.6683
8	PBB	40.2327	77.6707	130.836
9	TA	-124.306	30.7485	41.3367
10	UMG	-116.861	34.9741	227.033
11	ASB	-156.926	249.3569	277.2276
12	Kian Joo	-61.2120	48.3907	26.6203
13	Maurich	-48.5645	-30.6253	120.7347
14	MOX	9.7852	-11.9347	80.5002
15	Palmco	-30.8229	139.5774	162.6767
16	Suntech	-120.5970	-17.1026	74.9338
17	Bat	51.6470	-461.522	-336.68
18	UMW	12.1244	124.8870	166.8687
19	Bolton	-61.6557	79.2495	357.1041
20	Crimson	-83.2639	94.6471	129.0857
21	E&O	-77.6964	114.5050	170.7145
22	Inovest	-179.758	129.9401	210.6278
23	L&G	-221.001	-20.8255	197.2789
24	P Perak	-193.864	39.0351	130.5518
25	Muhibbah	-131.714	-237.3008	144.2462
26	PJ Dev	-64.1504	26.6739	131.5711
27	B'stead	-40.6916	-11.9459	241.3062
28	Gkent	-129.682	80.4465	256.6394
29	Muiind	-114.1	-83.8635	32.5267
30	Tanjung	4.0470	-63.8659	-0.4309
31	TNB	16.2118	19.4497	16.1949
32	Faber	-172.373	101.0218	262.0275
33	B'Katil	-47.3851	197.4859	279.0815
34	G Hope	-10.9034	-40.4216	1.4889
35	G Plus	-101.915	89.167	251.4789
	Average	-64.7119	42.7283	138.0714

Table 4.1 (b)
The Performance of Returns for Buy-and-Hold Strategy, Moving Average
and Japanese Candlestick Chart for 13 Securities from
KLSE's Second Board

No	Security	BNH	EWMA	JCC
1	Geahin	-94.1352	114.9242	274.6508
2	MCSB	-5.4562	298.9176	348.4088
3	Texchem	17.2692	50.3318	213.3622
4	FFHB	-87.8032	29.2819	278.4703
5	Fourssn	-76.9812	-15.4201	250.7825
6	TGL	-55.1127	93.1888	219.2536
7	Ayamas	30.3285	149.6	220.2765
8	Hiro	3.1983	74.4078	270.831
9	Promto	-61.3597	16.3394	238.4303
10	Denko	-38.4046	122.0092	347.3769
11	DPREP	-36.586	30.5203	178.8805
12	Lityan	-19.5042	199.5081	244.1608
13	YCS	-42.6944	51.1625	240.6459
	Average	-35.9416	93.4440	255.8100

Table 4.2 shows the returns by sector classification. Japanese candlestick chart obtained the highest returns for all sectors. As reflected also in the earlier results, buy-and-hold strategy performed poorly especially in Properties.

Table 4.2

**The Performance of Returns for Buy-and-Hold Strategy, Moving Average
and Japanese Candlestick Chart According to Sectors**

Sector	BNH	EWMA	JCC
Finance	-31.0459	94.1065	144.8123
Industrial Products	-56.1003	65.6021	177.7035
Consumer Products	-20.9662	-13.3307	133.1619
Properties	-136.2065	72.7586	199.2271
Construction	-79.5196	-53.1548	172.1544
Trading & Services	-43.3171	50.5493	172.8323

Table 4.3(a) presents the descriptive statistics for 48 securities. The coefficient of variation for each trading technique is shown to compare the relative reliabilities of the trading techniques. It is used as a measure of risk for a security. The result shows that moving average has the highest value of coefficient of variation and this conveys the message that it has the highest variability and is more volatile. Japanese candlestick chart has the smallest value of coefficient of variation, which means it is the most stable technique among the 3 trading techniques.

Table 4.3 (a)

Descriptive Statistics for 48 Securities in KLSE

	BNH	EWMA	JCC
Mean Returns	-56.9200	56.4638	169.959
Standard Deviation	66.0351	121.0519	118.016
Coefficient of variation (Absolute value)	1.1601	2.1439	0.6944

The descriptive statistics for securities according to the listing board is shown in Table 4.3 (b). The result shows that the coefficient of variation is the highest for moving average in Main Board and for buy-and-hold strategy in Second Board. The performance of moving average and Japanese candlestick chart are more stable when these techniques are used for securities in Second Board. The coefficient of variation of both techniques is smaller in Second Board.

Table 4.3 (c) shows the descriptive statistics for securities according to the sector. Japanese candlestick chart appeared to be the most stable trading technique for almost all of the sectors in this study, except for Finance where moving average has proved that it is more reliable. Moving average did not perform well in Industrial Products, Consumer Products, Properties, Construction and Trading & Services where it has the highest value of coefficient of variation.

Table 4.3 (b)
Descriptive Statistics for Securities According to The Listing Board

		BNH	EWMA	JCC
Main Board	Mean Returns	-64.7119	42.7283	138.071
	Standard Deviation	72.4209	130.221	120.555
	Coefficient of variation (Absolute value)	1.1191	3.0477	0.8731
Second Board	Mean Returns	-35.9416	93.4440	255.810
	Standard Deviation	39.6508	85.5284	49.2147
	Coefficient of variation (Absolute value)	1.1032	0.9153	0.1924

Table 4.3 (c)
Descriptive Statistics for Securities According to The Sector

		BNH	EWMA	JCC
Finance	Mean Returns	-31.0459	3.4613	8.8395
	Standard Deviation	62.2807	2.9470	17.6126
	Coefficient of variation (Absolute value)	2.0060	0.8514	1.9925
Industrial Products	Mean Returns	-56.1004	65.6021	177.7035
	Standard Deviation	53.9045	91.7417	110.319
	Coefficient of variation (Absolute value)	0.9609	1.3985	0.6208
Consumer Products	Mean Returns	-20.9662	-13.331	133.192
	Standard Deviation	59.6148	227.90	233.168
	Coefficient of variation (Absolute value)	2.8434	17.0959	1.7510
Properties	Mean Returns	-136.207	72.7586	199.227
	Standard Deviation	69.5635	55.5499	84.2710
	Coefficient of variation (Absolute value)	0.5262	0.7635	0.4230
Construction	Mean Returns	-79.5196	-53.155	172.154
	Standard Deviation	46.4573	159.944	59.6530
	Coefficient of variation (Absolute value)	0.5842	3.0090	0.3465
Trading & Services	Mean Returns	-43.3171	50.5493	172.8322
	Standard Deviation	60.8860	121.158	135.641
	Coefficient of variation (Absolute value)	1.4056	2.3968	0.7848

4.3 Comparison of Trading Techniques Across Boards or Sectors

In this section, One-way ANOVA is carried out to analyse the difference in returns across the boards or sectors under each trading technique.

4.3.1 Buy-and-Hold Strategy

Table 4.4 (a) presents the result of F-statistics for buy-and-hold strategy for the listing board. The null hypothesis (there is no difference in returns across the boards) holds out to be true at $\alpha=0.05$. This indicates that the board effect is not present and this trading technique will perform equally well for Main Board and Second Board securities.

The result of F-statistics for buy-and-hold strategy for different sectors is shown in table 4.4(b). The null hypothesis which states that there is no difference in returns across the sectors is rejected at $\alpha=0.05$. This indicates that sector effect is present and buy-and-hold strategy will generate different level of returns for different sectors.

Table 4.4 (a)
F Statistics for Buy-and-Hold Strategy for the Listing Boards in KLSE

	Sum of Squares	d.f.	Mean Square Error	F-Statistics	p-value
Between Boards	7846.211	1	7846.211	1.831	0.183
Within Board	197103.8	46	4284.866		
Total	204950.0	47			

Table 4.4 (b)**F Statistics for Buy-and-Hold Strategy for Different Sectors in KLSE**

	Sum of Squares	d.f.	Mean Square Error	F-Statistics	p-value
Between Sectors	55134.499	5	11026.90	3.045	0.022*
Within Sectors	130386.8	36	3621.856		
Total	185521.3	41			

** denotes rejection of null hypothesis at 5% level of significance*

As the F-statistics shows that the returns for sectors are different, Tukey test is performed to analyse the differences in the returns. Table 4.4(c) reveals the result of Tukey test. The result indicates that Properties is significantly different from Finance and Consumer Products. Other sectors are not significantly different among one another.

Table 4.4 (c)

**Results of Tukey Test for Pairwise Comparison with Sectors
as Main Effects**

(I) Sector	(J) Sector	Mean Difference (I-J)	p-value
Finance	Industrial Products	25.0545	0.942
	Consumer Products	-10.0797	0.999
	Properties	105.1606*	0.020
	Construction	48.4737	0.823
	Trading & Services	12.2712	0.998
Industrial Products	Consumer Products	-35.1341	0.875
	Properties	80.1061	0.144
	Construction	23.4192	0.992
	Trading & Services	-12.7832	0.998
Consumer Products	Properties	115.2403*	0.024
	Construction	58.5534	0.741
	Trading & Services	22.3509	0.982
Properties	Construction	-56.6869	0.766
	Trading & Services	-92.8894	0.710
Construction	Trading & Services	-36.2025	0.947

**The mean difference is significant at the 0.05 level*

4.3.2 Moving Average

Table 4.5(a) presents the result of F-statistics for moving average for the listing board while Table 4.5(b) presents the result of F-statistics for moving average for different sectors. The null hypotheses for both tests are not rejected at $\alpha=0.05$. The results indicate that neither board nor sector effect is present. Moving average will perform equally well for securities in both listing boards and in different sectors.

Table 4.5 (a)

F Statistics for Moving Average for The Listing Board in KLSE

	Sum of Squares	d.f.	Mean Square Error	F-Statistics	p-value
Between Boards	24381.147	1	24381.147	1.688	0.200
Within Board	664336.2	46	14442.092		
Total	688717.4	47			

Table 4.5 (b)

F Statistics for Moving Average for Different Sectors in KLSE

	Sum of Squares	d.f.	Mean Square Error	F-Statistics	p-value
Between Sectors	80716.326	5	16143.265	1.051	0.404
Within Sectors	553183.1	36	15366.196		
Total	633899.4	41			

4.3.3 Japanese Candlestick Chart

Table 4.6(a) reveals the result of F-statistics for Japanese candlestick chart for the listing boards. The result shows that the returns across the boards are significantly different at $\alpha = 0.05$. This indicates that the board effect is present and this trading technique will generate different level of returns for Main Board and Second Board securities.

The result of F-statistics for Japanese candlestick chart for different sectors is presented in Table 4.6(b). The sector effect is not significant at $\alpha = 0.05$, which indicates Japanese candlestick chart will perform equally well for securities in different sectors in this study.

Table 4.6 (a)
F Statistics for Japanese Candlestick Chart for The Listing Boards in
KLSE

	Sum of Squares	d.f.	Mean Square Error	F-Statistics	p-value
Between Boards	131403.8	1	131403.8	11.553	0.001*
Within Boards	523206.8	46	11374.062		
Total	654610.6	47			

** denotes rejection of null hypothesis at 5% level of significance*

Table 4.6 (b)
F Statistics for Japanese Candlestick Chart for Different Sectors in KLSE

	Sum of Squares	d.f.	Mean Square Error	F-Statistics	p-value
Between Sectors	19280.24	5	3856.048	0.242	0.941
Within Sectors	573405.4	36	15927.929		
Total	592685.7	41			

4.4 Comparison of Stock Trading Efficiency for Each Trading Technique

The result of two-way ANOVA with trading technique and the listing board as main effects is shown in Table 4.7(a). The null hypothesis which defines there is no difference in returns among the trading techniques is rejected at the level of significance $\alpha=0.05$. The null hypothesis which defines there is no difference in returns between the boards is also rejected at the level of significance $\alpha=0.05$. In addition, the interaction between trading techniques and listing boards is also significant at $\alpha=0.05$, which illustrates that different trading techniques generate different level of returns for securities in Main Board and Second Boards.

As the null hypothesis is rejected, Tukey test is performed to look for treatment differences that are responsible. The result shown in Table 4.7(b) indicates that buy-and-hold strategy is significantly different from moving average and Japanese candlestick chart at $\alpha=0.05$. The result also implies that there is significant difference between moving average and Japanese candlestick chart.

Table 4.7 (a)
ANOVA with Trading Technique and Listing Board as Main Effects

Source	Sum of Squares	df	Mean Square	F	p-value
Trading Techniques	1235378	2	617689	59.8027	0.000*
Listing Boards	122905.4	1	122905.4	11.8993	0.001*
Interaction	582603.5	2	291301.8	28.2029	0.000*
Error	1425373	138	10328.79		
Total	3243354	143			

** denotes rejection of null hypothesis at 5% level of significance*

Table 4.7 (b)
Results of Tukey Test for Trading Techniques
and Listing Boards as Main Effects

(I) Trt	(J) Trt	Mean Difference (I-J)	p-value
BNH	EWMA	-113.3828*	0.0
	JCC	-226.8790*	0.0
EWMA	JCC	-113.4951*	0.0

** The mean difference is significant at the 0.05 level*

The result of two-way ANOVA with trading techniques and sectors as main effects is shown in Table 4.8 (a). The effect of trading techniques is significant at $\alpha=0.05$, which reveals that returns are significantly different when applying different trading techniques.

The interaction between trading techniques and sector is also significant at $\alpha=0.05$, which illustrates that different trading techniques generate different levels of returns among sectors.

Tukey test is performed to look for treatment differences that are responsible for the rejection of null hypothesis. The result shown in Table 4.8(b) indicates that buy-and-hold strategy is significantly different from moving average and Japanese candlestick chart at $\alpha=0.05$. The result also implies there is significant difference in returns between moving average and Japanese candlestick chart.

Table 4.8 (a)
ANOVA for Trading Techniques Comparison with Trading
Technique and Sectors as Main Effects

Source	Sum of Squares	d.f.	Mean Square	F	p-value
Trading Techniques	1026629	2	513314.5	40.2307	0.0*
Sectors	34105.835	5	6821.167	0.5346	0.11
Interaction	239752.1	10	23975.21	1.8790	0.0*
Error	1378001	108	12759.27		
Total	2798245	125			

** denotes rejection of null hypothesis at 5% level of significance*

Table 4.8 (b)
Results of Tukey Test for Trading Techniques
and Sectors as Main Effects

(I) Trt	(J) Trt	Mean Difference (I-J)	p-value
BNH	EWMA	-106.5827*	0.0
	JCC	-221.0573*	0.0
EWMA	JCC	-114.4745*	0.0

**The mean difference is significant at the 0.05 level*

Table 4.9(a) reveals the result of chi-square test for different trading techniques according to the listing boards. The result indicates that the number of securities that produce highest return under each trading technique is significantly different at $\alpha=0.05$. From the table, it is apparent that the number of securities that generate highest return under Japanese candlestick chart is relatively higher compared to buy-and-hold strategy and moving average.

The number of securities that produce highest return in Main Board and Second Board individually under each trading technique are also significantly different at $\alpha=0.05$. The results are shown in Table 4.9(b) and Table 4.9(c) respectively.

Table 4.9 (a)
Chi-Square Test for Different Trading Techniques for
48 Securities in KLSE

	BNH	EWMA	JCC	Total
Actual Count	2	3	43	48
Expected Count	16	16	16	48

$$\chi^2 = 68.375 ; p\text{-value} = 0.0 *$$

** denotes rejection of null hypothesis at 5% level of significance*

Table 4.9 (b)
Chi-Square Test for Different Trading Techniques for
35 Securities in KLSE's Main Board

	BNH	EWMA	JCC	Total
Actual Count	2	3	30	35
Expected Count	11.7	11.7	11.7	35

$$\chi^2 = 43.257 ; p\text{-value} = 0.0 *$$

** denotes rejection of null hypothesis at 5% level of significance*

Table 4.9 (c)
Chi-Square Test for Different Trading Techniques for
13 Securities in KLSE's Second Board

	BNH	EWMA	JC	Total
Actual Count	0	0	13	13
Expected Count	4.3	4.3	4.3	13

$$\chi^2 = 26.2 ; p\text{-value} = 0.0 *$$

** denotes rejection of null hypothesis at 5% level of significance*