CHAPTER SIX

RISK AND RETURNS RESULTS AND ANALYSES

The analyses of the results obtained through different techniques mentioned in chapter four are shown here. The data used here are the KLCI, EMAS, and KLSI for Kuala Lumpur stock exchange, compiled from Bloomberg database in Bursa Malaysia and Bank Negara website. The data are composed of the closing prices for the three indices. The period of study is from April 1999 to December 2005 i.e. since the KLSI was first initiated in April 1999. The total number of observations for each index is 1678. In addition, the daily interbank deposit rate or KLIBOR for the same period was included for the calculation purposes. The description of the data is shown in section 4.1 of chapter 4. The variables used are expressed in the natural logarithm form. Therefore, KLSI and KLCI refer to the returns unless otherwise stated.

This part aims at investigating the performance of both indices in the above-mentioned period through comparing different measures of risk-adjusted return. In addition, time series analysis such as unit root, cointegration, Granger causality, and Vector error correction are conducted.

6.1 Series Characteristics

Table 6.1 below shows the Bursa Malaysia performance from 1999 to 2007. The market capitalization decreased in 2000, but it started to increase in the following years. The increment was slow in 2001 and 2002, but it increased at the end of 2003 to RM 640.3 billion. The slow increase between 2001 and 2002 might be due to the September 11 incident in 2001, which affected the global market as a whole. At the end of 2004, the market capitalization increased by 50%. On the contrary, the number of listed companies was not affected by the September 11 incident. It kept rising from 757 in 1999 to reach 987 in 2007. The total trading in terms of either volumes or value declined from 1999 to 2001. Yet the market gained momentum after 2001 where there was continuous increment in both the trading volumes and trading values suggesting market recovery.

Table 06.1 Performance of Bursa Malaysia[40]

Year	No. of Listed Companies	Market Capitalization (billions RM)	Total Trading Volume** (millions units)	Total Trading value (millions RM)
1999	757	552.69	85,156.6	185,249.5
2000	788	444.35	68346.3	222,310.9
2001	812	464.98	49663.5	850,120
2002	868	481.62	55630.2	116,951.4
2003	906	640.28	112,183.2	183,885.9
2004	963	722.04	107,610.2	215,622.8
2005	1021	695.27	102,338.2	177,321.1
2006	1027	848.70	197,508.8	250,641.0
2007	987	1,106.15	14304.81	282,611.1

** Based on market transaction

Table 6.2 shows the total number of companies listed under the KLSI and KLCI and the total market capitalization of the KLSI and KLCI form 1999 to 2007. KLSI started with more than 544 companies in 1999 and increased to 853 at the end of 2007. The market capitalization increased to represent more than 50% of the total market capitalization of the market. It is clear that both KLCI and KLSI have an increase in their market capitalization from 1999 to 2007. However, KLSI market capitalization has surpassed KLCI market capitalization. Although KLCI has only 100 companies listed from the total market listing, its market capitalization kept increasing through time.

Table 6.2 KLSI, KLCI in Bursa Malaysia[41]

[40] Economic report, 2000/2001 and 2005/2006

Year	Number of listed companies in KLSI	KLSI's Market capitalization (RM billion)*	KLCI's Market capitalization(RM billion)*
1999	544	270	221
2000	585	255	333
2001	636	296	284
2002	677	289	294
2003	699	384	305
2004	778	448	389
2005	818	441	451
2006	886	494	479
2007	853	705	606

* at the end of each year

Figure 6.1 shows the daily closing prices of both indices. It is apparent from the figure that both indices moved together. Moreover, the returns of both series seem to move together suggesting no difference in returns in both indices. That is if KLCI moves up it appears that KLSI moves in the same direction.

[41] BURSA MALAYSIA annual report 2005
http://www.klse.com.my/website/bm/about_us/investor_relations/downloads/Bursa_AnnRpt2005x1x.pdf
http://www.sc.com.my/ENG/HTML/icm/0801_msianicm.pdf

Figure 6.1 Daily returns for both indices

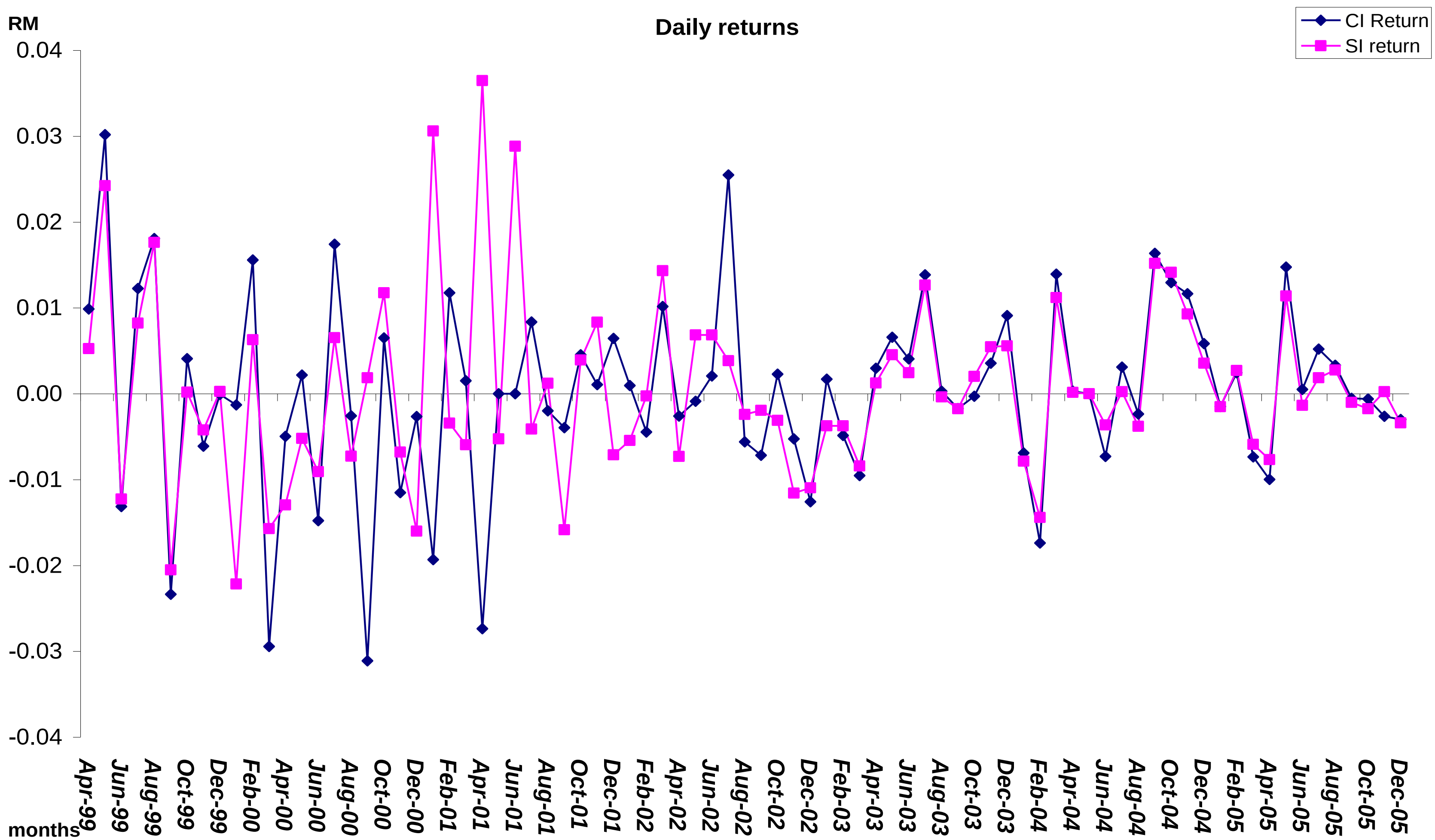


Figure 6.2 Daily closing prices for both indices

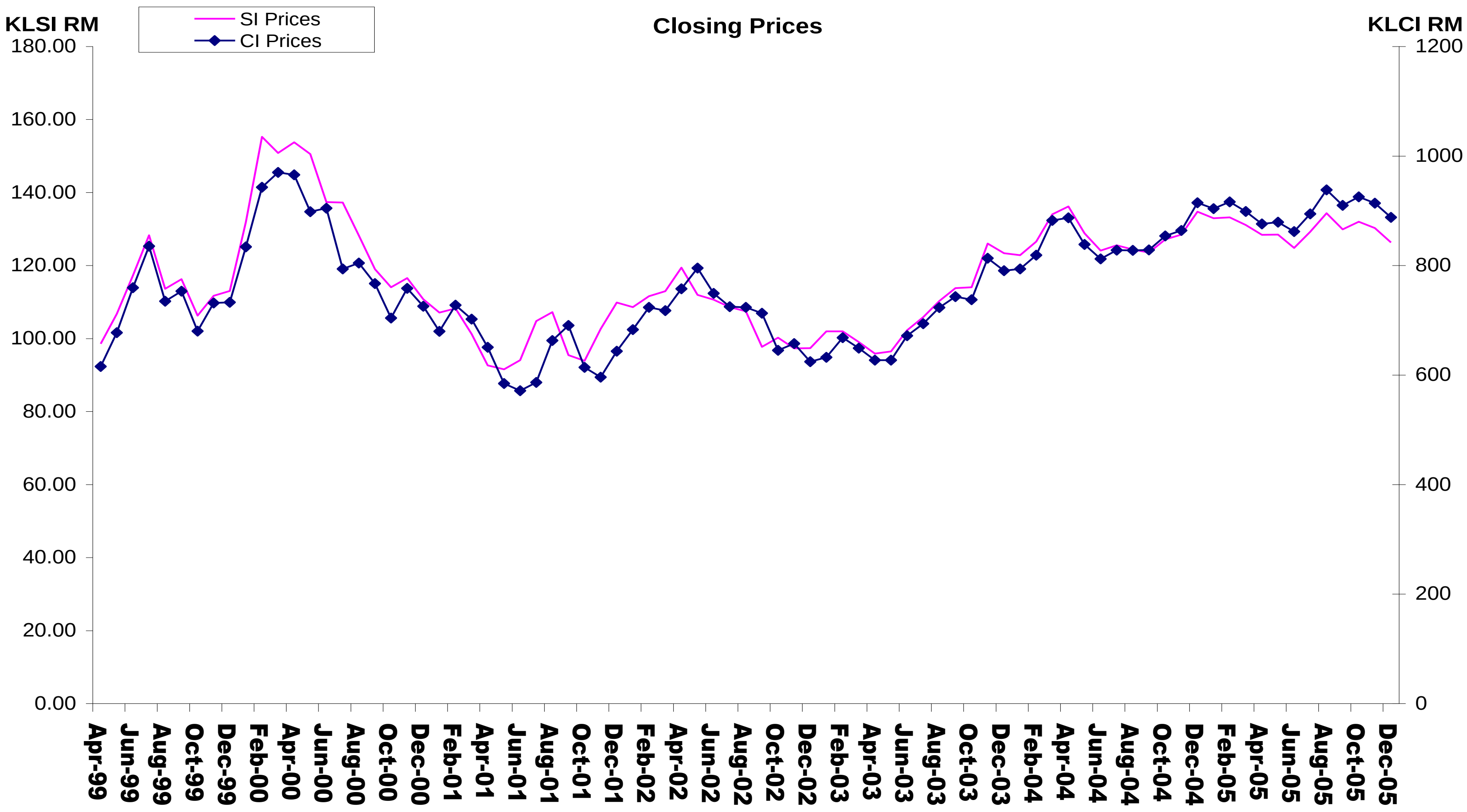


Table 6.3 is included to elaborate on the properties of the daily closing prices of both indices. The normality test suggests that the prices are not normally distributed. In terms of skewness, both indices seem to exhibit positive values, which indicate that the series are skewed to the right although the values are very small. For both series, kurtosis is positive which mean that they are platykurtic.

The correlation coefficient is very large, which suggests that both series tend to move together. It shows a very strong correlation of 94%, where as the returns show only 40% correlation, which is considered as moderately strong.

Table 6.3 Descriptive statistics of the daily prices

Property	KLCI	KLSI
Mean	771.89	117.54
Median	761.58	117.41
Maximum	1013.2	162.66
Minimum	553.34	87.46
Std. Dev.	106.05	15.16
Skewness	0.0241	0.235
Kurtosis	1.98	2.5249
Jarque-Bera	72.60*	31.24*
Observations	1678	1678
Correlation between stock market indices prices	0.94260*	

*significant at 1 %

Table 6.4 below shows the descriptive statistics for returns of both indices. It is clear that the mean return of the KLSI is less than that of KLCI. This is true for the standard deviation, which is a loose measurement of risk showing that KLSI is less risky than KLCI. Furthermore, the long-term raw return for both indices, which is measured by the sum of all returns in the period, suggests that KLCI has a superior long-term return than the KLSI.

The J-B normality test is significant at 1%, suggesting the rejection of the null hypothesis of normality of the data and implying that the series are not normally distributed. Both series are negatively skewed, which means they are skewed to the left and non-symmetric, as reported by Hussein et al. (2005), Mookerjee et al. (1999) and Corhay et al. (1994). In terms of kurtosis, they exhibit positive values or leptokurtic, which is contrary to the finding reported in most of the other studies.

The simple correlation coefficient figure is 40%, showing that there is a positive relationship between the indices. However, it is not as strong as in Ahmad et al. (2002), who found it to be positive at 96%. This might be because the number of securities listed under KLSI kept increasing while the securities under KLCI has been fixed at 100 since its first initiation in 1986. In addition, the number of securities incorporated in KLSI has increased from 276[42] in the beginning of the trading period, April 1999, to 826 in April 2005. This might be the cause of the decrease in correlation from 96% to 40.5%.

In other words, the method though which simple correlation coefficient is calculated is that the mean of each index will be used in the numerator and denominator. Since the KLSI components are not fixed like KLCI, this might be the main cause of the difference in the correlation coefficient in both studies. At the end of 2005, only 68 companies of the 100 included in KLCI were included in the KLSI. As for rest of the companies, they were involved in activities against Islamic laws like the sale of prohibited products or conventional insurance.

[42] http://www.bursamalaysia.com/website/mediacentre/mr/1999/990419.htm

Table 6.4 Descriptive statistics for daily returns of both indices

Property	KLCI	KLSI
Mean	0.00022224	0.000147447
Standard deviation	0.010540084	0.009842514
Maximum	0.058504936	0.046060478
Minimum	-0.063422014	-0.07089311
Sum	0.372695867	0.247269134
Kurtosis	5.631312707	6.186037616
Skewness	-0.113612578	-0.340565366
Jarque-Bera	2203.5*	2687.3*
Observations	1677	1677
Correlation between KLCI and KLSI returns	0.405299312*	

* Significant at 1%

6.2 Difference in Mean

To test whether there is a difference in the mean between the indices; t-test is used to infer the results. The result in Table 6.5 shows that the same can be concluded in this essay where there was no difference in mean between the indices.

This is supported by various studies such as Ahmad et al.(2003), Statman (2000), and Hussein et al. (2005) who proved that non conventional (Islamic or ethical) returns are not significantly different from conventional returns. The screening process in the Bursa Malaysia does not impose any extra cost on the KLSI return, which is contrary to Rudd (1981), who asserted that the screening process would impose additional risk without increase in returns not to mention the cost for portfolio investors.

Table 6.5 Mean difference between returns of KLCI and KLSI

Mean difference	t-value	P-value for T-test
0.00008	0.212	0.831

6.3 Risk Adjusted Performance

Table 6.6 below explains the risk adjusted returns for each index using four different measurements. The benchmark index is the EMAS index[43], which consists of all shares in Bursa Malaysia's main board. The first measurement is Sharpe ratio (1994), which takes into consideration the risk by its two types, systematic and unsystematic. Similar to Ahmed (2003) and Hussein et al. (2005), KLSI appears to provide less adjusted return than KLCI.

In addition, market risk (i.e. systematic risk) is used in the second measurement, Treynor index. The result indicates that KLSI return is lower than KLCI. The third measurement is Adjusted Jensen Alpha; KLSI is producing lower returns than its counterpart index. Finally, a look at the risk measured by Beta shows that KLSI is less risky than the KLCI, which may give a good explanation of the lower return, since lower risk will produce lower returns. A regression model produced both Alpha and beta for both KLSI and KLCI as dependent variables and EMAS index as an independent variable. Both models are significantly good and the R squared of both models is 99%, suggesting that EMAS index explains much of variation in both indices. This will lead to the cautious conclusion that EMAS index is a good benchmark for both indices. The result of the regressions is represented in the following equations

$$KLSI = -0.0125 + 0.995\text{EMAS}$$

$$KLCI = -0.0088 + 0.997EMAS$$

Finally, the excess standard deviation adjusted returns confirmed the results found by other measures, where KLSI produced lower returns than the KLCI. This result is in line with

[43] Refer to chapter 3 for more details on the use of EMAS index.

previous studies on ethical investment portfolios such as Cummings (2000), Statman (2000) and Hamilton et al. (1993) or on Islamic investment portfolio Hussein et al. (2005).

The fact that KLSI yielded lower returns than KLCI can be due to the inclusion of large market capitalization in the KLCI. It is known that the size is negatively related to returns. However, this might be true only for developed countries (Fama and French (1992) and Fama French (1995)). Claessens, Dasgupta, and Glen (1995) concluded that the relationship between returns and size are positive for developing countries including Malaysia. The justifications are that many of the developing markets were open to foreign investment portfolio during the sample period. Trade and other reforms took place in many of these countries and large firms had access to cheaper capital over the period of the study.

Table 6.6 Risk adjusted performance of KLCI and KLSI

Index	Sharpe Ratio	Treynor Index	Jensen Alpha	Beta	eSDAR
KLSI	0.00301	0.00002972	- 0.01245*	0.9954*	-0.3468
KLCI	0.00959	0.00010126	- 0.00875*	0.9968*	-0.1435

* Significant at 5%

6.4 Unit Root Analysis

There are few types of tests to investigate the problem of unit root or non-stationarity. Using both Augmented Dickey Fuller and Phillips-Perron tests the results in Tables 6.7 and 6.8 respectively were obtained. The Schwartz information criteria was used to determine the lag for indices in Augmented Dickey Fuller test, while for Philips-Perron test Newey-west bandwidth was used. The lags used for each index in ADF test are 1 lag for KLSI and 2 lags for KLCI. On the other hand, for PP test, 15 and 11 lags are used for KLSI and KLCI respectively. Both tests are used in the three specification levels; intercept, trend with intercept and without trend or intercept.

The results indicate that in both series the null hypothesis of unit root cannot be rejected, which indicates that the both indices are not stationary. Subsequently, when the null hypothesis of unit root is not rejected, it is concluded from the same tests on both indices in the first difference that the null hypothesis of unit root can be rejected. Accordingly, both series are stationary in the first difference and thus, both series are integrated of degree one or I (1). It is known from the random walk theory that the value of an asset at time t is equal to its value at time t-1 plus an error or disturbance term. It is reported that if the series is non-stationary in the level or has the problem of unit root, the common practice is to take its first difference, which makes the series stationary. The results are in line with the literature on financial markets where stock prices are non-stationary in the level form.

Unit root problem suggests that the fluctuations in the prices are randomly moving and this implies that they represent one of the types of the market efficiency namely, weakly efficient. Fama (1970 and 1991) hypothesized that if a market is weakly efficient, the historical information of past prices cannot be used to exploit a regular return pattern for obtaining abnormal returns. The behavior of stock prices should be a random walk and stock returns should not be correlated in a weak-form efficient market. Hakim et al. (2003), Chan et al. (1997) and Chan et al. (1992) asserted that if a series is found to be non-stationary, then it is interpreted as a sign of market efficiency, specifically weak-form efficiency.

Table 6.7 ADF Unit root test for stationarity[44]

Variable	Intercept	Trend and intercept	None
	Levels		
KLCI	-2.05 (0 lag)	-2.114 (0 lag)	0.66 (0 lag)
KLSI	-1.96 (1 lag)	-1.95 (1 lag)	0.48 (1 lag)
	First difference		
KLCI	-25.17* (1 lag)	-25.16* (1 lag)	-25.16* (1 lag)
KLSI	-35.39* (2 lags)	-35.38* (2 lags)	-35.39* (2 lags)

* Significant at 1%

Table 6.8 PP Unit root test for stationarity[45]

Variable	Intercept	Trend and intercept	None
	Levels		
KLCI	-2.07 (0 lag)	-2.14 (0 lag)	0.66 (0 lag)
KLSI	-2.13 (1 lag)	-2.12 (1 lag)	0.44 (1 lag)
	First difference		
KLCI	-36.44* (1 lag)	-36.43* (1 lag)	-36.44* (1 lag)
KLSI	-35.98* (2 lags)	-35.97* (2 lags)	-35.98* (2 lags)

* Significant at 1%

6.5 Cointegration

Based on the unit root test, both series are integrated of degree one or I(1). Subsequently, two types of cointegration tests are performed. The Engle-Granger test of the residual shows that the null hypothesis can be rejected and therefore, the residual is stationary at the level or I(0). Table 6.9 shows the results for ADF test for the residual in two cases. Hence, this confirms that both series are integrated of degree one. The series in both cases are found to be cointegrated. In addition, this result gives an indication that there is a bidirectional relationship between KLSI and KLCI since both residuals are significant at 1 %.

[44] lags are determined by Schwartz Information criteria
[45] lags are determined by Newey-west bandwidth

Table 6.9 Engle-Granger cointegration test.

Residual	Intercept	Intercept and Trend
$\nu_t = KLCI_t - \alpha - \beta KLSI_t$	-5.595*	-6.435*
$\varepsilon_t = KLSI_t - \delta - \phi KLCI_t$	-5.618*	-6.126*

*significant at 1%

The result for Johansen cointegration test, which follows maximum likelihood estimation, is in Table 6.10. The null hypothesis of no cointegration suggests that the relationship between the series is spurious. Table 6.11 below shows the results of Johansen cointegration in 24 lags determined by Akaike information criteria. It is clear that there is only one cointegrating vector, where the null hypothesis that there is no cointegrating vector is rejected based on Maximum Eigen value and Trace statistics. Hence, there is only one cointegration equation in the system, which will be used in estimating the Vector Error correction model. Subsequently, it is concluded that there is a long-term relationship between KLSI and KLCI. In other words, there is only one cointegration equation or one equilibrium equation. It means that both series will tend to trend together in the long term.

In addition, this indicates that the screening mechanism of KLSI might not have any effect on its temporal behavior in comparison to KLCI. In other words, the dropping of companies that are not complying with the selection process will not affect the movement along with the KLCI. This is in contradiction with Rudd (1981), who suggested that the selection process would tend to impose more risk and cost on the ethical portfolio. This, in return, causes the performance of the ethical investment portfolio to include less and less securities.

Table 6.10 Johansen cointegration

Number of cointegrating Vector	Max. Eigenvalue	Trace statistics
No cointegration vector r =0	13.5** (14.3)	16.63* (15.5)
At least one cointegrating vector r ≤1	3.16 (3.84)	3.16 (3.84)

* and **significant at 5% and 10%. Values in parentheses are critical values at 0.05.

This result is not in accordance with the results in Hakim et al. (2003), where it was found that DJIMI (Islamic index) is not cointegrated with Wilshire 5000 in the bivariate model. However, they were cointegrated with 3 months Treasury bill in the trivariate model. Yet again, Reyes et al. (1998) did not find any cointegration relationship between socially responsible and non-socially responsible funds.

The long run equilibrium is depicted below,

$$KLCI = 1.284 + 1.125KLSI$$

$$KLSI = 1.141 + 0.889KLCI$$

The equilibrium relationship suggests that the variables are positively related. That is, if KLSI increased by 1%, then KLCI increases by 1.1% and if KLCI increased by 1% KLSI will increase by 0.89% in the long run. These equations show that KLCI is more responsive to changes in KLSI then KLSI to the shocks in KLCI.

Hence, as indicated previously by Granger (1986) and supported empirically by Chan et al. (1992), Chelley-Steeley et al. (1994), Masih et al.(1995) and Chan (1997), if the series are found to be cointegrated, this means that the market is not efficient because the error term of one series can predict the movement of the other. This assertion shows that the Bursa Malaysia is not efficient in terms of KLCI and KLSI in the period studied.

6.6 Causality Test

6.6.1 Granger Causality

Since the series are found to be cointegrated, this suggests that at least there is relationship between them. However, cointegration does not specify in which direction the causality flows. Therefore, the causality between these two series can be investigated using Granger Causality. In the first section, it is found that there is positive correlation between the indices that is supported by the cointegration test. Nevertheless, it is not clear in which direction the relationship moves.

This might raise some doubts since the KLCI was established long before the KLSI. This statement carries conviction. However, it was indicated earlier that almost 68% of the companies listed in KLCI are included in KLSI listing. Furthermore, KLSI covers more companies than KLCI, while KLCI covers only 100 companies, as at end of April 2005 KLSI covered 826 companies from the total 1003 listed at Bursa Malaysia. The implication of this is that the trading in these companies drives the market as a whole either up or down and the weight of the effect on KLSI might be greater than KLCI. That leads to the strong relation flowing from KLSI towards KLCI and the weakness of the opposite.

Table 6.11 summarizes the result of the causality of each variable on the other. The Granger causality test indicates that the causality is bidirectional. However, the result shows that the result of KLSI causing KLCI is higher than KLCI causing KLSI. In conclusion, the null hypotheses can be rejected in both cases. However, it is apparent that the F-value of the null hypothesis concerning the direction of relationship from KLSI toward KLCI is higher than the opposite.

Table 6.11 Causality test

Null hypothesis	Chi-square
KLSI does not Granger cause KLCI	7.94*
KLCI does not Granger cause KLSI	1.42***

* and*** Significant at 1% and 10%

6.6.2 Vector Error Correction Model (VECM)

The cointegration process is to illustrate the long-term relationship but not the short-term dynamics. The existence of cointegration brings about the concept of error correction mechanism whereby how fast the correction in the deviation from the equilibrium takes to adjust can be determined. Engle and Granger (1987) indicated that with the presence of cointegration there always exist a corresponding error correction mechanism which implies that changes in the dependent variable is in fact a function of the level of disequilibrium in the cointegrating equation as well as changes in the independent variable.

The error correction function has two important properties embedded intrinsically, namely long run and short run properties. The former refers to the included error term derived from the basic regression between KLSI and KLCI[46]. The latter, however, is captured partially by the coefficient of the error correction variable in the error correction model equation. The short run coefficient of the error term will indicate how much the dependent variable, if out of the equilibrium, needs to be changed in the next period. Put differently, the error correcting term refers to the speed of the adjustment in the system if it is out of the equilibrium. The remaining portion of the short-term behavior is explained by the inclusion of the explanatory variable. ECM for KLSI and KLCI is performed both ways from the

[46] This is because the coefficient of the explanatory variable is the long-term multiplier in the original model.

former to the latter and vice versa. This is called Vector ECM (VECM), where the dependent variable will appear on both sides of the equation[47].

Table 6.12 and Table 6.13 report the two estimated results for both models. The variables used are the first difference of each index. The lag used in this estimation is 24 lags based on Akaike information criteria.

The first model has error correcting mechanism of 1.9%, which is significant and with the expected sign. This indicates that if KLCI is out of the equilibrium, it is adjusted by 1.9 % in the long term. This means that the convergence takes longer time for KLCI to return the system to its long run equilibrium within that period due to small error correction coefficient. In other words, if the error equilibrium increases by one percent, it causes KLCI prices to fall by 1.9 percent, others being constant. This seems to be slow since the speed of adjustment is only 1.9 %. This implies that any shock that changes the KLCI will take longer time to adjust to its equilibrium values.

Moreover, this indicate that KLCI is endogenous while KLSI is weakly exogenous. In other words, the movement in KLCI does not affect KLSI but vice versa. This indicates that KLSI is affected by the long term investment portfolio rather than movement in the price of KLCI.

When variables are cointegrated in the short run, deviations from the long-term equilibrium will feed back on the changes in the dependent variable in order to force movements

[47] The ordinary VECM suffers from ARCH problem. It was solved and the reported results of the VECM are free from ARCH problem.

towards long-term equilibrium. That is, if the KLCI, in the first model, has a statistically significant error correcting value, it means it is responding to its feedback. Thus, it is clear that the KLCI is responding to both short term and long-term feedback since the error term is significant and the F-value of the model is significant. However, KLSI is in equilibrium in the long-term since its error term is insignificant while any shocks will be adjusted by the short run dynamics because the F-value is significant.

On the one hand, only seven KLCI lags in the first model are significant although the sign is not stable. For KLSI in the first model only six lags are significant and positive except for the first lag. On the other hand, when KLSI was regressed against itself and the KLCI, the results of model 2 in Table 6.12 suggests no statistically significant coefficient of the error or the speed of adjustment.

The R^2 and the adjusted R^2 are 13 % and 10 % for the first model and 8 % and 5% for the second model respectively. This indicates the amount of the variation in KLCI that is explained by the explanatory variables. In terms of causality or short run multiplier, the results imply that KLSI causes KLCI based on F-value, which is significant at 5%.

Table 6.12 VECM for KLCI vs. KLSI

Dependent Variable KLCI[48]			
Lag	Coefficient	Lag	Coefficient
$\Delta KLCI_{t-1}$	0.10*	$\Delta KLSI_{t-1}$	-0.052***
$\Delta KLCI_{t-2}$	0.048**	$\Delta KLSI_{t-2}$	0.042
$\Delta KLCI_{t-3}$	-0.03	$\Delta KLSI_{t-3}$	0.082*
$\Delta KLCI_{t-4}$	-0.063*	$\Delta KLSI_{t-4}$	0.022
$\Delta KLCI_{t-5}$	0.03	$\Delta KLSI_{t-5}$	-0.0013
$\Delta KLCI_{t-6}$	-0.01	$\Delta KLSI_{t-6}$	0.011
$\Delta KLCI_{t-7}$	-0.05**	$\Delta KLSI_{t-7}$	0.12*
$\Delta KLCI_{t-8}$	0.011	$\Delta KLSI_{t-8}$	0.024
$\Delta KLCI_{t-9}$	-0.029	$\Delta KLSI_{t-9}$	0.013
$\Delta KLCI_{t-10}$	0.07*	$\Delta KLSI_{t-10}$	-0.038
$\Delta KLCI_{t-11}$	-0.013	$\Delta KLSI_{t-11}$	0.029
$\Delta KLCI_{t-12}$	-0.024	$\Delta KLSI_{t-12}$	0.026
$\Delta KLCI_{t-13}$	-0.078*	$\Delta KLSI_{t-13}$	-0.019
$\Delta KLCI_{t-14}$	-0.038	$\Delta KLSI_{t-14}$	-0.031
$\Delta KLCI_{t-15}$	0.012	$\Delta KLSI_{t-15}$	0.023
$\Delta KLCI_{t-16}$	-0.029	$\Delta KLSI_{t-16}$	0.031
$\Delta KLCI_{t-17}$	-0.009	$\Delta KLSI_{t-17}$	0.029
$\Delta KLCI_{t-18}$	-0.018	$\Delta KLSI_{t-18}$	-0.038
$\Delta KLCI_{t-19}$	-0.011	$\Delta KLSI_{t-19}$	-0.011
$\Delta KLCI_{t-20}$	-0.026	$\Delta KLSI_{t-20}$	0.044
$\Delta KLCI_{t-21}$	-0.036	$\Delta KLSI_{t-21}$	0.055**
$\Delta KLCI_{t-22}$	-0.003	$\Delta KLSI_{t-22}$	0.038
$\Delta KLCI_{t-23}$	-0.071*	$\Delta KLSI_{t-23}$	0.19*
$\Delta KLCI_{t-24}$	-0.054	$\Delta KLSI_{t-24}$	0.04
EC_{t-1}	-0.019*		
R^2 0.12			
Adj R^2 0.1			
F-statistics= 4.7*			
Breusch-Godfrey Serial Correlation LM Test: 2.02			
ARCH Test: 0.059			

*, **, and *** significant at 1%, 5%, and 10%.

[48] GARCH (1,1) model was included for both estimations to solve the problem of Heteroscedasticity, and autocorrelation.

Table 6.13 VECM for KLSI vs. KLCI

Dependent Variable KLSI			
Lag	Coefficient	Lag	Coefficient
$\Delta KLCI_{t-1}$	0.038	$\Delta KLSI_{t-1}$	0.13*
$\Delta KLCI_{t-2}$	-0.005	$\Delta KLSI_{t-2}$	0.036
$\Delta KLCI_{t-3}$	0.018	$\Delta KLSI_{t-3}$	0.008
$\Delta KLCI_{t-4}$	-0.057*	$\Delta KLSI_{t-4}$	0.02
$\Delta KLCI_{t-5}$	0.028	$\Delta KLSI_{t-5}$	0.035
$\Delta KLCI_{t-6}$	-0.021	$\Delta KLSI_{t-6}$	-0.012
$\Delta KLCI_{t-7}$	0.024	$\Delta KLSI_{t-7}$	0.034
$\Delta KLCI_{t-8}$	-0.028	$\Delta KLSI_{t-8}$	0.037
$\Delta KLCI_{t-9}$	0.010	$\Delta KLSI_{t-9}$	-0.03
$\Delta KLCI_{t-10}$	0.027	$\Delta KLSI_{t-10}$	0.04
$\Delta KLCI_{t-11}$	-0.057*	$\Delta KLSI_{t-11}$	0.027
$\Delta KLCI_{t-12}$	0.053**	$\Delta KLSI_{t-12}$	-0.037
$\Delta KLCI_{t-13}$	0.014	$\Delta KLSI_{t-13}$	-0.10
$\Delta KLCI_{t-14}$	0.0035	$\Delta KLSI_{t-14}$	-0.014
$\Delta KLCI_{t-15}$	-0.010	$\Delta KLSI_{t-15}$	0.027
$\Delta KLCI_{t-16}$	-0.025	$\Delta KLSI_{t-16}$	-0.0027
$\Delta KLCI_{t-17}$	-0.022	$\Delta KLSI_{t-17}$	0.0043
$\Delta KLCI_{t-18}$	-0.006	$\Delta KLSI_{t-18}$	0.026
$\Delta KLCI_{t-19}$	-0.036	$\Delta KLSI_{t-19}$	0.016
$\Delta KLCI_{t-20}$	0.0006	$\Delta KLSI_{t-20}$	-0.012
$\Delta KLCI_{t-21}$	-0.0084	$\Delta KLSI_{t-21}$	0.06*
$\Delta KLCI_{t-22}$	0.052**	$\Delta KLSI_{t-22}$	-0.036
$\Delta KLCI_{t-23}$	0.046***	$\Delta KLSI_{t-23}$	0.021
$\Delta KLCI_{t-24}$	-0.10*	$\Delta KLSI_{t-24}$	0.031
EC_{t-1}	0.004		
R^2= 0.08 Adj R^2 =0.054 F-statistics= 2.72* Breusch-Godfrey Serial Correlation LM Test: 1.12 ARCH Test: 0.93			

6.8 Variance Decomposition

Tables 6.14 and 6.15 display the result of variance decomposition of both series in thirty days using different ordering. The choice of the time horizon of 30 days is to see how relevant it is to the effect of the ordering[49]. The results for the first ordering[50] shows that,

[49] 90 days variance decomposition is included in appendix A to show that the trend remains the same in term of the exogenous and endogenous variable with the different ordering.
[50] The first ordering is KLCI followed by KLSI.

though not statistically significant, the KLCI is endogenous because up to the 30th day only 32% of KLCI is explained by KLSI, which indicates that KLSI is influential. On the other hand, KLSI is exogenous because at the 30th day 17% of the innovation in KLSI is explained by KLCI, suggesting that KLCI is less influential than KLSI itself, though not statistically significant. As, for the second ordering[51] the results suggest that KLSI is the most exogenous index since up to the 30th day only 0.18% of the variation is explained by KLCI, while KLCI is the most endogenous since up to the 30th day 64% of the variation is explained by KLSI. This result is consistent with the long run equilibrium results that suggested that KLSI is the exogenous variable while KLCI is the endogenous variable.

Table 6.14 Variance decomposition for KLCI and KLSI for 30 days (KLCI, KLSI ordering).

	Period	KLCI	KLSI
Innovations in KLCI	1	100	0
	5	99.10	0.90
	10	93.70	6.30
	15	88.13	11.87
	20	83.06	16.94
	25	76.16	23.84
	30	68.34	31.66
	Period	KLCI	KLSI
Innovations in KLSI	1	14.60	85.40
	5	17.04	82.96
	10	16.97	83.03
	15	17.70	82.30
	20	17.73	82.27
	25	17.54	82.46
	30	17.01	82.99

[51] The second ordering is KLSI followed by KLCI.

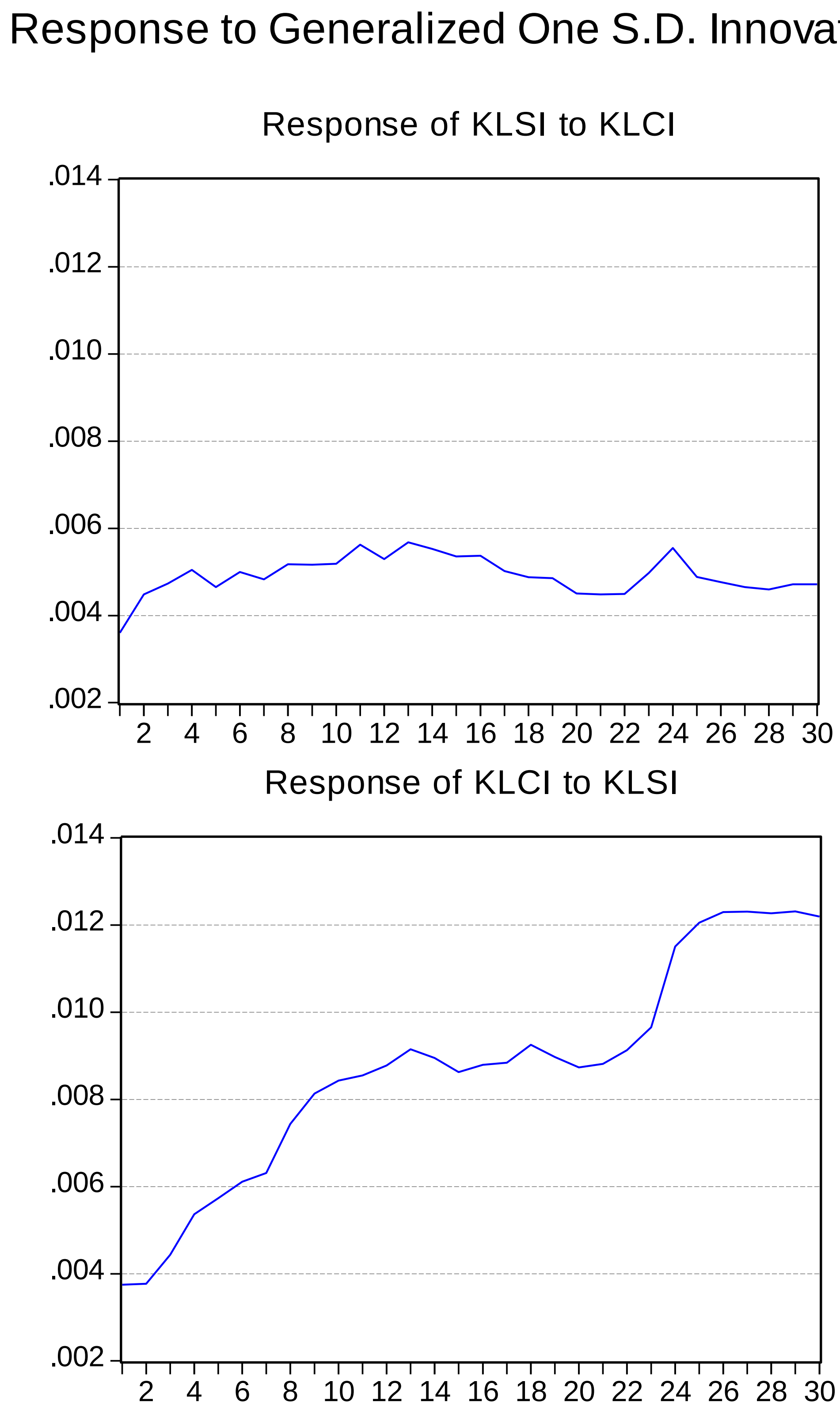
Table 6.15 Variance decomposition for KLCI and KLSI for 30 days (KLSI, KLCI ordering).

	Period	KLCI	KLSI
Innovations in KLSI	1	85.40	14.60
	5	80.68	19.32
	10	67.86	32.14
	15	58.24	41.76
	20	51.27	48.73
	25	43.76	56.24
	30	36.14	63.86
	Period	KLCI	KLSI
Innovations in KLCI	1	0	100
	5	0.15	99.85
	10	0.12	99.88
	15	0.22	99.78
	20	0.23	99.77
	25	0.22	99.78
	30	0.18	99.82

6.9 Impulse Response

Figure 6.3 illustrates the impulse response of KLSI and KLCI to one-standard deviation shocks in KLCI and KLSI respectively. In addition, Figure 6.3 of the impulses responses for the 30 days supports the variance decomposition. The first graph in Figure 6.3 shows the response of KLSI to the shocks in KLCI. It is clear that in the first two-day KLSI jumps to more than 0.4% however, it stays in the margin between 0.4% and 0.6% for the remaining of the period. The second graph of Figure 6.3 shows the response of KLCI to shocks in KLSI. The graph clearly depicts that KLCI is very sensitive to shocks in KLSI. KLCI jumps from almost 0.4% in the first day of the shock to nearly 0.9% in the 14th day to stabilize for almost 10 days and then jumps again to slightly more than 1.2% by the 26th day. Again, the strong influence of KLSI on KLCI is clear, which suggests that it dominate the market. In other words, the result supports the exogeneity of KLSI and the endogeneity of KLCI.

Figure 6.3 Impulse responses for one standard deviation innovation for 60 days.



6.10 Conclusion

This part of the thesis addresses three main hypotheses. The first is whether there is a difference in returns between Syariah and non-Syariah indices. The second is whether there is no long-term relationship between screened and non-screened indices. The third is whether there is a unidirectional or bi-directional relationship between the indices. It is concluded that there was no difference between returns between the indices, both indices are cointegrated, indicating that one can be used to predict the other, and there is a bidirectional relationship between both indices. The findings indicate that the screened investment portfolios perform as well as the non-screened investment portfolios. This indicates that the screened investment portfolio does not face extra risk and does not yield lower returns due to the higher risk. Investors are indifferent between both investment portfolios since they yield the same returns. In terms of cointegration, the results implied another strong point of the screened investment portfolios that it follows the market movement represented by the largest 100 companies. This means that if it is forecasted that the market is going to be bullish then screened investors can use this as an indication that screened investment portfolio follows that trend and the same goes for the bear market. Investors investing in screened investment portfolios have an advantage since their investment portfolio follows the market portfolio and therefore it is easier to predict its movements. Lastly, the causality results support the cointegration test. This implies that since both indices cause each other an investor is free to use one index to predict the movement of the other.