CHAPTER 7

CONCLUSION

7.1 Summary of the Study

The main purpose of this study is to examine the linkages or interdependence among the sectors in the KLSE, particularly the Finance, Industrial, Plantation, Mining and Property Index. The returns were computed from the daily closing index of the respective sectors. The entire sample period covers 29 March 1993 to 30 June 1999.

The analysis is divided into two major parts. The first part encompasses the entire sample period and it is referred to as the long-term analysis because the sample covers more than 6 years of data. The entire sample period was divided into four unique sub-periods which was based on different market conditions. The first sub-period covers 29 March 1993 to 5 Jan 1994 and this sub-period represents a growing stock market. The second sub-period covers 6 January 1994 to 28 February 1997 and this is the period prior to the Asian financial crisis, when the stock market was booming in general. The third sub-period covers 3 March 1997 to 1 September 1998 and it represents the period of the currency turmoil. The fourth sub-period covers 2 September 1998 to 30 June 1999 and it shows the recovery period of the stock market. The 4 sub-periods were analysed individually and the results were compared. We refer to this as the short-term analysis.

7.2 Summary of the Results for the Entire Sample Period

In this study, the long-term interdependence among the five sectors of KLSE were examined. All the sectoral indices are not stationary at levels. After taking the first differences, the ADF and Phillip-Perrons tests show that the series are first-differenced stationary. Thus, all the sectoral indices are said to be integrated of order 1, or I(1).

Based on the cointegration test, a single cointegrating vector was found to exist. This means the sectoral indices are linked together by a long-run equilibrium relationship. Having one cointegrating vector implies that there are four common stochastic trends that exist among the five sectoral indices. The existence of the long-run equilibrium relationship indicates the tendency to move together among the indices.

The presence of one cointegrating vector gives rise to one error correction term (ECT) to be included in the VEC model. The ECT is an error correcting mechanism that adjusts any deviations back to the long-run equilibrium path. Based on the results obtained, the adjustments in the finance and property sectors seem to be the fastest, given a 1 percent deviation from the long-run equilibrium path. Both the sectors adjust by 0.16 percent and 0.15 percent respectively. Adjustment is the slowest in the industrial sector with only a mere 0.07 percent.

Based on the Granger causality test, the finance sector seemed to be the most important sector as it led most of the other sectors. This shows that the finance sector is important in the 1990's. The study of Kok and Goh (1994) showed that

the finance sector was the dominant sector in the periods 1990-1991 and 1992-1993. In this study, it further shows the dominance of the finance sector for the period 1993-1999. Thus, changes in finance related macroeconomic policies are expected to have important impact on the other sectors.

The VEC model was used to forecast the daily indices of the five sectors for the month of July 1999. Overall, the forecast indices follow the actual indices rather closely. Based on the MAPE results, the smallest error was recorded in the Plantation Index with 1.17 percent. The largest error was found in the Mining Index with 3.57 percent. Although the VEC model has reasonably good forecasting power, the Theil's U results show that it did not perform better than the no change model.

7.3 Summary of the Results for the Four Sub-Periods

The four sub-periods explained earlier were used in the short-term study as they cover short periods of the entire sample period. Four VAR models were fitted for the four sub-periods. The sectoral causal relationship was obtained from these models. In the first sub-period, there was no clear leading sector among the five sectors. It was a period when the stock market was growing. All the sectors were doing well and their shares were highly traded in the KLSE.

The second sub-period saw the dominance of the plantation sector over the other sectors except for the mining sector. On the other hand, the mining sector has some impact on the plantation sector. There was also a two-way causality between the industrial and finance sectors. As mentioned in Chapter 6, the

importance of the plantation and mining sectors in this sub-period was due to the growth in the palm oil sector and natural gas.

The finance sector was the leading sector in the third sub-period. This is during the period of the financial crisis and any measures taken, particularly relating to the financial policies affected all the other sectors.

In the fourth sub-period, there are signs that the industrial sector was leading all the other sectors but it did not dominate very strongly. There was a slight recover in the economy and a lot of businesses started to revive. A more certain exchange rate and easily available credits facilities offered by the banks have helped the industrial sector to recover.

The variance decomposition (VDC) measures the out of sample causality relationship. In this study, one to five days ahead VDC were used to evaluate how a change in the returns of a sector are explained by its own innovations and innovations of the other sectors. Overall, the results show that there are variations up to the first three days following a shock in any sector. The change stabilizes on day four and five.

Of the four sub-periods, the sectoral returns were the most exogenous in the first sub-period. This was because a change in the returns was mostly explained by the changes in their own sectors. However, this pattern did not hold in the second sub-period as there was a drop in the proportion of variances that are explained by its own sectoral movements. In the third and forth sub-periods, the

finance sector explains most of its own variance and shocks in the other sectors. We also found that self driven innovations are important in a growing market when the indices were upward trending. This seems to agree with the self-fulfilling or "bubble" phenomenon when market performance is trending upwards.

Based on the VAR models fitted for the fourth sub-period, a one-period ahead forecast of daily sectoral indices was obtained for the July 1999. Overall, the forecast values are quite close to the actual indices. A comparison of the accuracy of forecast based on the VEC model and VAR model was made. The results show that the VEC model gives better forecasting power as the forecasting errors were smaller than those of the VAR model. This suggests that the long-run equilibrium relationship is important for forecasting.

7.3 Implication on Stock Market Efficiency

A semi-strong form of market efficiency suggests that publicly available information does not help to predict future stock prices. Our study shows that the sectoral indices follow some common trends in the long run and the long-run relationship can be modeled. Furthermore, lead-lag relationships were found among the sectors. All these enable us to model the short and long-run relationships among the sectoral indices. The models use publicly available information and can be utilized to forecast sectoral indices. One day ahead forecasting errors remain below 4 percent. These results show that the KLSE is not efficient in the semi-strong form, at least on daily basis.

7.5 Limitations of the Study and Recommendations for Future Research

This study includes only five of the sectoral indices in the KLSE. There are a few sectors which were not included such as the construction and infrastructure sectors. Although these two sectors were excluded for the reasons mentioned in Section 4.1, they can be included for future work. Inclusion of these sectors into the analysis might give new perspectives to our discussions.

To measure the volatility of the four sub-periods, only the coefficient of variation was used and the Bartlett test was applied to show that the four sub-periods have different volatility. This might not be sufficient because the volatility was not modeled and included in our analysis. In future, the use of autoregressive conditional heteroscedasticity (ARCH) or generalized ARCH models can be considered.

In this study, the variance decomposition was included to study the out of sample causality relationship among the sectoral returns. Another method, which serves a similar purpose is the impulse response function (IRF). It traces the response of each of the sectors to a shock to an individual sector in the system. The IRF can be used to examine the responsiveness of the different sectors towards an innovation in a sector in future studies.

The VEC model was used in the study for the entire sample period. One weakness in this model is it does not take into consideration the structural change in the economy. In practice, the economy undergoes various changes and

faces a lot of market uncertainties. This may lead to different transitional periods. Thus, models that can accommodate the structural changes are preferred.

There is a lack of diagnostic tests in this study. The VEC model and VAR model are systems of equations. A series of diagnostic tests should be applied to the systems to ensure that we have check for serially uncorrelated errors, homoscedastic error variances, normally distributed errors and correct functional form. However, these tests are not carried out in this study due to the unavailability of statistical softwares that can run the diagnostic tests for the VEC and VAR models as a system. It is hoped that these tests can be included in future studies.