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# DYNAMIC RELATIONSHIP BETWEEN SECTOR-SPECIFIC INDICES AND MACROECONOMIC FUNDAMENTALS

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## Abstract

*This study focuses on the issue of long-run and short-run relationships between sector-specific indices of Bursa Malaysia and macroeconomic variables. The traditional variable under observation in analyzing stock market performance has been an aggregate stock market index. However, the application of an aggregate index could lead to misleading interpretation on the actual performance of each sector in Bursa Malaysia. Therefore, the main objective of this study is to analyze the dynamic properties of the relationship between sector-specific indices of Bursa Malaysia and macroeconomic variations. The sectoral indices of Bursa Malaysia selected for this study are namely, Construction, Plantation, Consumer Product, Finance, Industrial Product, Mining, Hotel, Property and Trading and Services. The macroeconomic variables are represented by real economic activity, interest rate, inflation rate, money supply and exchange rate. The monthly data series of the macroeconomic variables and stock market indices are obtained for the period from 1993 to 2006. This study has identified various trends of responses among the sector-specific indices towards the innovation in macroeconomic variables. The results suggest that unanticipated changes in macroeconomic variables could lead to similar patterns in some of the sector-specific indices with the effects differing mainly in terms of speed of adjustments towards equilibrium level in the long-run.*

**Keywords:** *dynamic reactions, sector-specific indices, co-integration, vector error correction model,*

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## **Introduction**

The relation between the stock market and macroeconomic forces has been widely analyzed in finance and macroeconomic literature. The linkages between equity prices and macroeconomic variables such as real economic activity, money supply, inflation rates, interest rate and exchange rates are of crucial importance in analyzing equity returns in relation to portfolio investment. Many researchers have concurred that macroeconomic variables have a significant contribution in determining stock performance. An illustrative list of studies includes Fama (1981); Friedman (1988); Chen (1991); Mukherjee and Naka, (1995); Nasseh and Strauss (2000); Tatom (2002), Hope and Kang (2005). They discover the significant effects on the stock prices by changes in macroeconomic conditions. The results from previous studies also indicate that asset prices sensitively react to macroeconomic news. Researchers believe that various patterns of stock price movements are due to different expectations among investors towards future cash flows as well as different levels of discount rate for their investment. They conclude that macroeconomic variation is considered as a significant factor in explaining stock price movements.

However, changes in macroeconomic fundamentals that could have different effects on sector-specific indices have not been discussed in most of the previous studies. Studies such as Geske and Roll (1983); Chen, Roll and Ross (1986); Keraney and Daly (1998); Fifield, Power and Sinclair (2000); Panetta (2002); Masayami and Sim (2002); Christopher, Minsoo, Hua and Jun (2006) are more concerned with the aggregate stock market index as the measurement for the overall performance of the stock market instead of individual sector-specific indices in their analyses. In other words, the study on the movements of sector-specific indices is still lacking. The aspect of dynamic movements of sector-specific indices should be seriously considered because the changes in macroeconomic variables could contribute a greater influence to certain sectors as compared to other sectors in stock market. It is expected that the changes in macroeconomic variables would generate different effects on different sector-specific stock returns.

In addition, there are other studies on sector-specific analysis of the stock market and return from equity investment by among others, Griffin and Karolyi (1998); Capaul (1999); King, Oscar and Guo (2002); Griffin (2002); Martin (2003) who analyze portfolio investments in various sectors. However, the aspect of the influence of macroeconomic variables on the movement of sector-specific indices has not been thoroughly discussed. The main focus of their studies is in constructing a portfolio investment that contributes to higher liquidity and returns. However, the analyses on the dynamic relations between macroeconomic factors and the sector-specific indices have not been well explored particularly in emerging markets including Malaysia.

Therefore, a comprehensive analysis on the dynamic relations between macroeconomic variables and stock market performance based on sector-specific indices should be addressed in order to have a better understanding of macroeconomic changes in relation to fluctuation in sector-specific indices. Bursa Malaysia as one of the stock market in

emerging economies has been chosen due to lack of discussion from previous studies that examine the dynamic relations between macroeconomic factors and the sector-specific indices. The present study is focusing Malaysian stock market as the main source of data analyses.

Specifically, this study examines the long-term dynamic interaction between sector-specific indices of Bursa Malaysia and macroeconomic variables as well as measuring the magnitude and persistence of the responses in all of sector-specific indices due to changes in macroeconomic fundamentals. The proxy for the stock price variable is the indices for all the sectors of Bursa Malaysia. There are nine (9) main indices based on sectors or industries at Bursa Malaysia namely Consumer Product, Industrial Product, Construction, Properties, Trading and Services, Finance, Hotels, Plantation and Mining. This study employs a selected set of macroeconomic factors: Economic activity (GDP), Consumer Price Index for inflation rates (CPI), Government Treasury Bills for interest rates (R), M1 for money supply (LM) and the exchange rates (EXH). The data used are monthly generated data spanning from year 1993 to 2006.

In brief, this study is aimed to contribute the information that most investors require particularly in constructing an effective equity portfolio investment. The present study is able to generate general rather than specific information that could be useful for the investors in considering sectoral indices in their equity portfolio investment. Specifically, this study is not providing specific strategies for the investors for them to apply in their investment. Instead, it is more on providing additional information that could be blend together with some other information in order to generate more effective strategy in equity portfolio investment.

This paper proceeds as follows. The next section provides the literature review on the subject while Section 3 explains the research methods. Section 4 discusses the results and Section 5 concludes the paper.

## **Literature Review**

It is widely believed that stock market price is related to macroeconomic fundamentals. The relation between the stock market price and macroeconomic forces has been widely analyzed in finance and macroeconomic literature (Fama, 1981; Chen, Roll and Ross, 1986; Kwon and Bacon, 1997; Flannery and Protopadakis, 2002; Hondroyiannis and Papapetrou, 2001; Masayami and Sim, 2001a; Park and Ratti, 2000; Praphan and Subhash, 2002).

*“Asset prices are commonly believed to react sensitively to economic news. Daily experience seems to support the view that individual assets prices are influenced by a wide variety of unanticipated events and some events have a more pervasive effect on asset prices than do others (Chen, Roll and Ross, 1986).”*

The above quotation indicates that any variation in macroeconomic variables could contribute to certain shock on stock returns. It is also concurred by Masayami and Sim (2001b) and Binder, John, Merges and Matthias (2001). This situation suggests that different sectoral indices of the stock market react differently towards changes in macroeconomic variables particularly in the aspects of magnitude, direction and persistence. It also indicates that macroeconomic variables have certain influence on the sectoral performance in the economy as measured by sectoral outputs. On the other hand, the sectoral output could also contribute to the changes in stock return. The sectoral analysis has become one of the important aspects in equity market due to its contribution to security pricing (Kritzman and Sebastien, 2002). Investors have to be more analytical in diversifying their equity portfolios in minimizing the portfolio risks as well as maximizing the overall return from an investment. The benefits of stock diversification are clearly observed as demonstrated by the wide range of portfolio investment strategies applied by the investors in equity market (Grubel, 1968; Lessard, 1973; Lin, 2000; Surz, 2007). Other previous studies have also identified the significant role of sector analysis in relation to stock market returns (Roll, 1992; Baca, Garbe and Weiss, 2000; Sadorsky, 2003; Ratner and Leal, 2004; Reily and Brown, 2002). All of these studies show that sector concentration is a significant variable affecting equity markets.

In linking the effect of macroeconomic shock to different economic sectors, Ibrahim (2005) analyzed the effects of monetary policy shocks on economic sectoral outputs for Malaysia (agriculture, forestry & fishing; mining & quarrying; manufacturing; construction; electricity, gas & water; transport, storage & communication; wholesale & retail trade; finance, insurance, real estate & business services). His study adopted a standard vector autoregressive framework as a way to assess the reaction between aggregate production, sectoral production and monetary shocks. Some sectors were found to be more easily affected by monetary changes. The manufacturing, construction, finance, insurance, real estate and business services sectors seem to respond sensitively to changes in interest rates. This study also observed the insensitivities of agriculture, forestry, fishing, mining, quarrying, electricity, gas and water towards interest rate changes.

Another study concerning the effect of macroeconomic shocks on the movement of sectoral stock market indices has been explored (Ewing, Forbes and Paynes, 2003). This study considered the effect of macroeconomic shocks on the changes in five major Standard & Poor (S&P) sector-specific stock market indices. The generalized impulse response analysis was employed in analyzing the effects of shocks to macroeconomic variables on various economic sectors as referred to in the five S&P market indices. Macroeconomic variables were found to be associated with stock market behaviour as represented by the movement of sectoral indices. The results identified various responses of the sectors to unanticipated changes in some macroeconomic variables. The finding revealed greater volatility in some indices than in others in responses to macroeconomic shocks.

## **Methodology**

The aim of this section is to explain the methods in analyzing each sector of Bursa Malaysia by focusing on the dynamic interaction between sector-specific indices and the changes in selected macroeconomic variables. There are nine (9) sectoral indices of Bursa Malaysia selected for this study namely, Construction, Plantation, Consumer Product, Finance, Industrial Product, Mining, Hotel, Property and Trading and Services. The monthly data series stock market indices (monthly closing index) are obtained for the period from 1993 to 2006. Meanwhile, this study employed a selected set of macroeconomic fundamentals (monthly data as reported by Bank Negara Malaysia): Real Gross Domestic Product for productivity in economy (GDP), Consumer Price Index for inflation rates (CPI), Government Treasury Bills for interest rates (R), M1 for money supply (LM) and special drawing right (SDR) for exchange rates (EXH). This study has focused on certain approaches of data analyses namely error-correction framework and granger causality. In relation to long-run movement, the Vector Error Correction Model (VECM) of Johansen (1991) performs a better ability to explore the co-movements among the variables examined. On the other hand, the issue of a dynamic reaction between the stock returns and macroeconomic variables in this study could also be analyzed by Granger-causality analysis. The application of the Granger-causality approach is due to its ability in identifying the equilibrium level for the proposed dynamic time series model in the short-run (Hiemstra and Jones, 1994).

## **Descriptive Analysis**

Table 4.1, Table 4.2 and Table 4.3 provide the summary statistics for all the variables in this study. Specifically, Table 4.1 reveals that the mean and median values of each series of macroeconomic variable were much closer to each other except for exchange rate (EXH) and interest rate (R). The distribution of the series could be considered as slightly dispersed as represented by the standard deviation values, particularly for interest rate (R). On the other hand, the skewness of the distributions was considered as approximately normal as its values were closer to zero. The results from this analysis also revealed that the kurtosis values for all of the series were less than 3.0. This finding provided a general indication that the distributions of the series of macroeconomic variables were normal. The Jarque-Bera values also indicated that the distributions of all the macroeconomic variables were normal except for inflation rate (CPI), exchange rate (EXH) and interest rate (R).

The information concerning the normality distribution of the series for macroeconomic variables could also be observed in the normal probability plot (NPP) as shown in Figure 4.1. The fitted line in the NPP was more or less a straight line for gross domestic product (LGDP), money demand (LM) and exchange rate (EXH). This finding demonstrated that the macroeconomic variables of gross domestic product, money demand and exchange rate were normally distributed.

Table 4.1: Descriptive Statistics for All Macroeconomic Variables

	LGDP	LM	CPI	EXH	R
Mean	10.84317	11.18141	2.559375	4.770767	4.071875
Median	10.84618	11.14200	2.650000	5.030000	3.050000
Maximum	11.18248	11.81000	4.800000	5.957200	8.900000
Minimum	10.45080	10.51900	1.200000	3.412800	2.000000
Std. Dev.	0.181393	0.343221	0.968452	0.746815	1.671521
Skewness	-0.120053	0.201052	0.053681	-0.508903	0.725493
Kurtosis	2.323378	1.931871	1.539610	1.730536	2.115947
Jarque-Bera	3.436456	8.683914	14.29510	17.64978	19.24607
Probability	0.179384	0.013011	0.000787	0.000147	0.000066

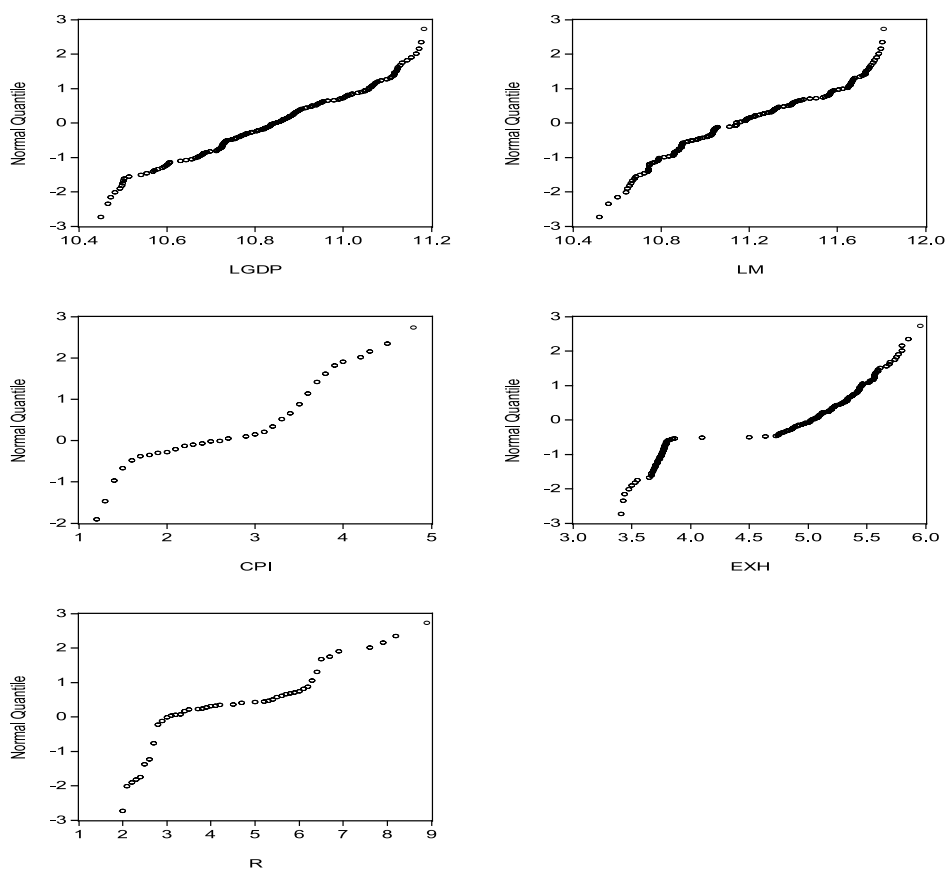


Figure 4.1: Normal Probability Plot for Macroeconomic Variables

Table 4.2 and Table 4.3 provide the summary statistics for all the sector-specific indices of Bursa Malaysia. The findings showed that the mean and median values of each series of the sector-specific indices were much closer to each other except for KLSECON, KLSEPRP and KLSEINP. The distributions of the series of sector-specific indices were considered approximately normal as the skewness values were closer to zero. The results from this study also revealed that the kurtosis values for all of the series of sector-specific indices were less than 3.0 except for KLSEFIN. Furthermore, the Jarque-bera values also indicated that the distributions of all the sector-specific indices were normal except for KLSECON, KLSEPRP, KLSEINP and KLSEMIN. All of the findings in this section provided some general indications that the distributions of most of the series of sector-specific indices were normal.

Table 4.2: Descriptive Statistics of Sectoral Indices Variables  
(*KLSECON, KLSECOP, KLSEFIN and KLSEINP*)

	KLSECON	KLSECOP	KLSEFIN	KLSEINP
Mean	248.0899	190.0673	6464.536	100.7993
Median	188.8250	183.8700	6694.475	80.49000
Maximum	590.1500	283.1500	11433.10	218.0000
Minimum	63.23000	83.86000	1695.380	40.20000
Std. Dev.	125.0275	40.65124	1807.652	42.12607
Skewness	0.966535	-0.040830	-0.201653	0.874387
Kurtosis	2.735526	2.433945	3.160770	2.265334
Jarque-Bera	25.06080	2.153318	1.240977	23.68648
Probability	0.000004	0.340732	0.537682	0.000007

Table 4.3: Descriptive Statistics of Sectoral Indices Variables  
(*KLSEPLN, KLSEPRP, KLSEMIN, KLSETAS and KLSEHTL*)

	KLSEPLN	KLSEPRP	KLSEMIN	KLSETAS	KLSEHTL
Mean	2258.877	1251.992	356.6095	130.7852	370.5169
Median	2239.490	769.0250	331.9050	126.7200	367.4600
Maximum	4215.230	3371.000	858.0000	230.0000	628.8800
Minimum	1137.370	414.6100	85.90000	47.36000	117.0000
Std. Dev.	603.5216	846.6641	151.4940	34.82513	121.8062
Skewness	0.439502	0.917967	0.746285	0.318243	-0.073301
Kurtosis	2.757809	2.201006	3.043565	2.542324	2.097928
Jarque-Bera	5.472764	26.39290	14.67861	4.045999	5.498576
Probability	0.064804	0.000002	0.000650	0.132258	0.063973

In addition, Figure 4.2 shows the Normal Probability Plot for Sector-specific Indices of Bursa Malaysia for the period from 1993 to 2006. It indicates that the fitted line in the NPP is almost a straight line for most of the sector-specific indices except for KLSECON, KLSEPRP and KLSEINP. This finding is consistent with the results presented in Table 4.2 and Table 4.3, in confirming the normal distribution of the series.



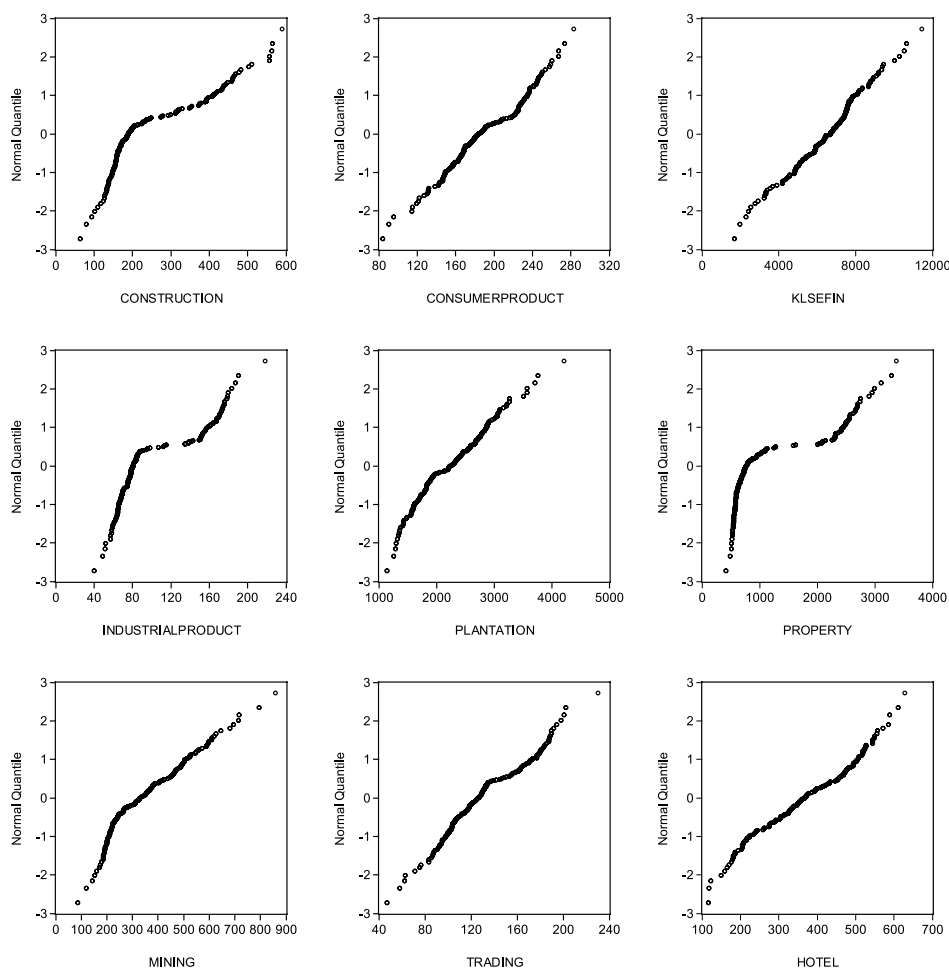


Figure 4.2: Normal Probability Plot for Sector-specific Indices

## Discussion of Findings

Most of the findings from the present study particularly on dynamic properties of sectoral indices of Bursa Malaysia are found to be consistent with prior studies as discussed in the following sections.

### Long-Run Adjustment of Sectoral Indices of Bursa Malaysia

The following discussion focuses on the differences of the adjustments made by the sectoral indices of Bursa Malaysia in response to variations in macroeconomic variables. Table 4.4 presents the speed of adjustment coefficient in capturing the previous period's deviation in long-run equilibrium. From the nine coefficients of the error correction term

Table 4.4 : Long-run Adjustment Coefficient for KLSE Sectoral Indices

Adjustment Coefficient	Dependent Variable				
	$\Delta$ KLSECON	$\Delta$ KLSECOP	$\Delta$ KLSEHTL	$\Delta$ KLSEPLN	$\Delta$ KLSEPRP
$ECT_{t-1}$ (Speed of Adjustment)	-0.065*	-0.153*	0.002	-0.032	-0.215*
Length of Period	15.38 months	6.54 months	500 months	31.25 months	4.65 months

Adjustment Coefficient	Dependent Variable			
	KLSEFIN	KLSEINP	KLSETAS	KLSEMIN
$ECT_{t-1}$ (Speed of Adjustment)	-0.133*	-0.141**	-0.117**	-0.092
Length of Period	7.52 months	7.09 months	8.55 months	10.87 months

Note: \* and \*\* indicates 1% and 5% significance levels.

as estimated for the sectoral indices, this study reveals that only six indices implied the speed of adjustment back to the long-run equilibrium. This study also shows the elimination of discrepancy in the movements of the sectoral indices. This finding has led to the understanding that the long-run equilibrium relationships did not appear between the error terms and KLSEHTL, KLSEPLN and KLSEMIN. In other words, the error terms did not significantly respond to the disequilibrium in KLSEHTL, KLSEPLN and KLSEMIN.

The speeds of the adjustment coefficients for various sectoral indices models were found to be significantly laden with negative values that ranged between (-0.065) and (-0.153). Most of the sectoral indices of Bursa Malaysia were significantly identified to adjust towards long-run equilibrium except KLSEPLN, KLSEHTL and KLSEMIN. Specifically, the speed of the adjustment coefficient values for KLSECOP, KLSEPRP, KLSEFIN, KLSEINP and KLSETAS were more than 10 percent. Meanwhile, other sectoral indices of Bursa Malaysia indicated the speed of adjustment coefficient values less than 10 percent. The greatest and the smallest speed of the adjustment coefficient values were observed for KLSEPRP (-0.215) and KLSEHTL (0.002) respectively. Hence, it could be surmised that the sectoral indices of Bursa Malaysia corrected the magnitude of disequilibrium every month, in order to achieve stability in the long-run equilibrium. For example, the speed of the adjustment coefficient values for KLSECON and KLSEPRP are -0.065 and -0.215, which indicate that 6.5 percent and 21.5 percent of the changes in KLSECON and KLSEPRP price indices contributed to the equilibrium level in the long-run respectively. In other words, KLSEPRP corrected the magnitude of disequilibrium in greater percentage every month as compared to the adjustment in KLSECON. This situation was also supported by the length of period that each sectoral indices of Bursa Malaysia had incorporated to achieve equilibrium in long-run. Table 4.4 clearly indicated that KLSEPRP had significantly adjusted towards disequilibrium in shorter period (4.65 months) as compared to KLSECON (15.38 months). Other sectoral indices that had significantly corrected the magnitude of disequilibrium for less than 10 months were

KLSECOP, KLSEFIN, KLSEINP and KLSETAS. Furthermore, KLSEHTL was identified to have the longest period to achieve long-run equilibrium.

Thus, the present study indicated that six sectoral indices that significantly implied the speed of adjustment towards long-run equilibrium were namely, KLSECON, KLSECOP, KLSEPRP, KLSEFIN, KLSEINP and KLSETAS (Refer to Table 4.4). It also confirmed that the speeds of the adjustment for the identified indices significantly explained the correction of the sectoral indices movements towards its stability in the long-run. Nevertheless, the error correction terms for KLSEHTL, KLSEPLN and KLSEMIN did not significantly respond to the disequilibrium in the long-run. This corroborates the findings by Chong and Goh (2001) who also discovered that error correction terms contributed to the adjustment of stock return in the long run.

### **Granger Causality Test on Short-run Relationship between Sectoral Indices of Bursa Malaysia and Macroeconomic Variables**

This section examines the relationship between KLSE sectoral indices and macroeconomic variables in the short-run. Information regarding the short-run relationships between the variables was obtained from Granger causality test and the results are shown in Table 4.5.

Table 4.5: Short-Run Relationship between Sectoral Indices and Macroeconomic Variables

Sectoral Index Price	Economic Variables				
	$\Delta$ RGDP	$\Delta$ LM	$\Delta$ R	$\Delta$ CPI	$\Delta$ EXH
$\Delta$ KLSECON	0.215 (-)	0.023** (+)	0.868 (-)	0.916 (-)	0.943 (+)
$\Delta$ KLSECOP	0.455 (-)	0.396 (+)	0.905 (-)	0.627 (+)	0.974 (+)
$\Delta$ KLSEHTL	0.941 (-)	0.008* (+)	0.660 (-)	0.512 (+)	0.533 (+)
$\Delta$ KLSEPLN	0.736 (-)	0.020** (+)	0.971 (+)	0.857 (-)	0.571 (+)
$\Delta$ KLSEPRP	0.083*** (-)	0.372 (+)	0.822 (-)	0.985 (+)	0.851 (-)
$\Delta$ KLSEFIN	0.003* (-)	0.000* (+)	0.856 (+)	0.600 (+)	0.604 (+)
$\Delta$ KLSEINP	0.867 (-)	0.010* (+)	0.868 (+)	0.852 (+)	0.628 (-)
$\Delta$ KLSETAS	0.167 (-)	0.013** (+)	0.920 (-)	0.861 (+)	0.548 (+)
$\Delta$ KLSEMIN	0.956 (-)	0.944 (+)	0.985 (+)	0.515 (-)	0.891 (+)

Note: \*, \*\* and \*\*\* indicate 1%, 5% and 10% significance levels. Shown in the table is the probability value while “+” and “-” signs indicate the causal link or relationship magnitude.

First and foremost, the results from Granger causality tests in the present study indicate that most of the sectoral indices of Bursa Malaysia were not significantly granger caused by GDP in the short-run, except for KLSEPRP and KLSEFIN. The direction of causality is found to be negative and this contradicts with findings from other studies that indicate a positive direction (Fama, 1990; Chen, 1991; Ferson and Harvey, 1991). Those findings reveal that stock returns and future economic growth, as measured by real production activity, are highly correlated in a positive direction. It seems that the positive news of the corporation concerning the improvement in productivity and profitability increases investors’ confidence in their investment in stock market. In other words, any increase in

the productivity level or GDP will be able to improve future earning of a corporation. It indicates that the corporation is in good condition in achieving better prospects for higher performance in the future. This situation increases investors' confidence towards the future success of the corporation. Thus, a positive impact on stock prices could be observed.

However, the negative direction of causality in this present study is in line with the study conducted by Achسانی and Hans (2002) in which similar findings had been established in Jakarta Stock Exchange. In addition, the stock price has also been identified to have an inverse relationship with the growth level of the industrial production (George and Evangelia, 2001). In other words, the growth in industrial production reacts negatively to stock return. This situation explains the negative causality direction of the GDP in relation to most of the sectoral indices in the present study. The most important finding from the present study that could be highlighted is that the increase in industrial production does not necessarily lead to a higher level of stock returns (Ibrahim and Rahman, 2003; Chaudhuri and Smile, 2004; Foresti, 2006). This supports the fact that the stock market indices and macroeconomic variables, especially national output, are not cointegrated (Muzafar and Ahmad, 1996; Binswanger, 2000; Vassalou, 2003; Lovatt and Parikh, 2000). Indeed, movement in GDP does not always confirm that there is similar direction in the movement of sectoral indices in the short run (Arestis, Demetriades, Panicos, Luintel and Kul, 2001).

In the meantime, money supply has been identified as a significant granger cause for most of the sectoral indices in positive direction in the short run with the exception of KLSECOP, KLSEPRP and KLSEMIN. This finding is consistent with previous studies that indicate positive causal effect by money supply towards stock return (Mukherjee and Naka, 1995; Naka, Mukherjee and Tufte, 1990; Ghazali and Ramlee, 2001; Ghazali and Soo, 2002; Gilchrist and Leahy, 2002). In fact, the finding of the present study that relates to effects of money supply on the positive direction of stock returns concurs with findings from earlier studies conducted in developing economies that establish the causality effects of money supply on stock returns (Kwon and Bacon, 1997; Masayami and Koh, 2000; Chong and Goh, 2005; Muradoglu, Metin and Argae, 2001; Ibrahim, 2001).

The positive relation between money supply and stock return could be observed in terms of investment preferences among the investors. The changes in money supply contribute certain effects particularly in constructing portfolio investment strategies among investors. It reflects the different preferences among the investors in determining the portion of investment instruments including stock in their portfolio investment. Specifically, the increase in money supply could lead to the changes in investors' preferences towards investing in stock. In other words, the stock price will increase in response to a higher demand for stock investment.

Furthermore, the present study has documented that a majority of the sectoral indices react negatively towards variations in interest rates with the exception of KLSEPLN, KLSEINP, KLSEMIN and KLSEFIN. There is a negative relationship between stock prices and interest rates just as what has been predicted. This finding is consistent with previous studies conducted by Fama and Schwert (1977), Geske and Roll (1983), Chen,

Roll and Ross (1986), Achsani and Hans (2002), Praphan and Subhash (2002), Mazhar (2003a) and Sharkas (2004). Obviously, there is a direct relationship between discount rate for stock valuation and interest rate. The increase in interest rate would affect higher discount rate in stock valuation. This means that an increase in interest rates raises the required rate of return, which in turn inversely affects the value of the asset.

However, other studies have also reported mixed signs at different lags in relation to interest rates' influence on stock returns (Twerefou and Michael, 2005; Omran, 2003). The mixed signs of direction signifying the influence of interest rates on stock returns could be due to the inefficient nature of the stock market. The effect of interest rates on stock prices' movements is indeed an empirical question. Since the rate of inflation is positively related to money growth rates (Bodurtha, Cho & Senbet, 1989), an increase in interest rate may lead to an increase in the discount rate and this may depress the stock prices. Such negative effects on the stock prices, however, may be countered by the economic stimulus provided by money growth. Such stimulus, often referred to as a corporate earning effects, would likely result in increased future cash flows and stock prices.

In addition, this present study has also confirmed the mixed influence of inflation rates towards sectoral indices movements. Some of the sectoral indices that have been found to be negatively granger caused by inflation rates are KLSEPLN, KLSEMIN and KLSECON. This finding is consistent with studies by Chen, Roll and Ross (1986), Rene (1986) and Nathan (2001). They have identified a negative direction of granger causality from inflation rates towards stock prices. The inflation rates is an important element in determining stock prices movements due to the fact that during the times of high inflation, people recognise that the market is in a state of economic difficulty (Rene, 1986). Thus, production undergoes severe cut and dividends diminish. When dividend decreases, the expected return of stocks also decreases, causing stocks to depreciate in value. A growing inflation will increase the nominal risk-free rate and raise the discount rate in the valuation model and therefore the stock prices will be decreased (Chen, Roll and Ross, 1986; Mukherjee and Naka, 1995; Khil and Lee, 2000).

However, the inflation rates also contribute to a positive direction of granger causality towards most of the sectoral indices in the present study. This finding has been observed in other studies that analyse the dynamic movements of sectoral indices in the short-run (Mazhar, 2003a; Mazhar, 2003b; Ibrahim, 2003; Chong and Goh, 2005). Therefore, the exact relation of granger causality between inflation rates and stock prices remains unclear.

Furthermore, the mixed influence of exchange rates on the sectoral indices movements is also observed in the present study. Previous studies also revealed similar findings by considering aggregate stock market index as proxy in the analysis (Ibrahim, 2000; Granger, Huang and Yang, 2000; Smyth and Nandha, 2003). Most of the sectoral indices of Bursa Malaysia are found to be positively granger caused by exchange rates in the short-run except KLSEPRP and KLSEINP. This finding is consistent with the result documented by Solnik (1974), Mukherjee and Naka (1995), Abdunasser and Manuchehr

(2002) and Kwon and Bacon (1997). The changes in the exchange rate could contribute certain effects to the countries in emerging economies that are involved in import and export activities (Doong, Shuh, Yang, Sheng, Wang and Alan, 2005; Kyimaz, 2003). Specifically, the export values for certain countries are lower in the international market if their currencies depreciate against the U.S dollar. This situation not only leads to an increase in export quantity but also an improvement in the performance of domestic economy (Kim, 2003; Hatemi and Irandoust, 2002; Phylaktis, Kate, Ravazzolo and Fabiola, 2005; Dellas and Hess, 2002). In other words, for most corporations that experience great performance in terms of profitability level, a positive impact on the stock return could be observed. Meanwhile, the negative direction of granger causality, effected by exchange rates on sectoral indices such as KLSEPRP and KLSEINP, could be considered as in line with the findings from previous studies (Ibrahim, 2003; Mazhar, 2003a). Therefore, it could be concluded that interest rates, inflation rates and exchange rates were not granger cause to the sectoral indices of Bursa Malaysia in the short-run as compared to real GDP and money demand. In other words, the performance of the sectoral indices in the short-run could be influenced by other macroeconomic variables as well as the policy of the government in stabilising the economy.

## **Conclusions**

One of the principal motivations of this study is to identify the dynamic relationship between sector-specific indices of Bursa Malaysia and macroeconomic variables in various horizons and the research outputs are based on specific analyses which relate to vector error correction model and granger causality. This study has identified long-run relationships between sector-specific indices of Bursa Malaysia and a set of selected domestic macroeconomic variables. Most of the macroeconomic variables in this study were found to have a certain influence towards the movement of the sectoral indices. The innovations in macroeconomic variables seemed to contribute a significant explanation on the long-run movement of the sectoral indices towards equilibrium. In summary, the results from this study ascertained the fact that most of the sectoral indices of Bursa Malaysia were affected by the changes within the macroeconomic variables particularly the direction of response, the magnitude of impact as well as the persistence of response in various horizons are among important aspects that could be produced by the present study. In other words, the findings from this study could be able to contribute significant general information to investors that may be interested in diversifying their portfolio investment in various sectors by combining with other relevant information in achieving maximum return at minimum level of risk. Hence, the findings from this study will provide important guideline for investors in formulating their portfolio investment strategies in maximizing overall returns.

There are several possible directions for future investigations. First, a different approach in evaluating the movement of sectoral indices in various horizons could be implemented. This would allow for a comparative assessment of several approaches in order to determine the best approach for estimating the dynamic properties of different sectoral indices. Since this study applies only vector error correction model (VECM) and innovative

accounting approaches (Impulse Response Functions and Variance Decompositions), it would be meaningful to evaluate the dynamic movement of sectoral indices by considering other approaches such as Generalized Moment Model (GMM) and Autoregressive Distributive lag (ARDL). Any problems related to the order of integration could be solved by considering ARDL method especially when the underlying variables are non-stationary and the variables are cointegrated (Pesaran and Shin, 1997).

The second proposition is to include other types of input. Data of sectoral indices (daily or weekly basis) together with the other macroeconomic variables (trade balance, oil prices and long-term interest rate) could be included in the analysis. This would probably show some differences in the dynamic properties of sectoral indices as compared to the present study.

Third, it would also be interesting knowledge should prospective researchers use data from other developed and emerging markets. The results from such studies are expected to provide useful information concerning sectoral indices movement in various financial markets particularly in terms of direction of response, magnitude of effect and length of response due to variations in macroeconomic variables.

Finally, besides conducting comparative studies between developed and emerging markets or among countries in emerging economies, additional assessments can be done particularly on the issue of different reactions of sectoral indices towards changes in economic cycles, in local as well as global perspectives.

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