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The Money Market Sensitivity on the Stock Market

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ABSTRACT

This paper employs the cointegration tests and error correction model to investigate the impact of easing money market on stock returns in Malaysia following the Asian financial crisis during 1997 to 2000. The monthly data on Kuala Lumpur Interbank Offer Rates (KLIBOR), the monthly closing of Kuala Lumpur Composite Index (KLCI) and the sector indexes - construction, consumer product, finance, industrial product, plantation, properties, mining, and trading and services, from January 1, 1997 to December 31, 2000 are used. The results suggest that there is long-term relationship between KLIBOR and sub sample 2, KLIBOR and constructions, KLIBOR and properties, and KLIBOR and mining. The sub period 2 shows significant positive unidirectional causality running from stock market to money market. With regards to the relationship between sector indexes and KLIBOR, in no instance, either long-run or short-run, is there an evidence of cointegration between sectors indexes and KLIBOR for all cases. Our empirical results suggest that an easing money market rate does not have positive impact on stock return. Other economic factors such as exchange rate, inflation rates or economic growth could drive equity prices.

Keywords: *cointegration test, error correction model, inflation rates, equity prices*

Introduction

The discussions on the impact of interest rate changes on the prices of financial assets have a long history in economic literature. Until lately, it has become a subject of discussions among scholars, academicians, practitioners of financial

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institutions and monetary policymakers. The general believe of many of these discussions is that relatively high and volatile interest rates have placed many of the firms in jeopardy of failing and are more vulnerable to adverse liquidity shocks, thus reducing their market value reflected in the stock price.

Similar argument is also put forward to suggest that the monetary policy actions affect interest rates, which in turn affect equity market. They argue that stock prices respond rapidly and positively (negatively) to unexpected monetary easing (tightening), e.g. an unexpected decrease or increase in the money market rates. This behaviour is consistent with the theoretical argument that variations in interest rates affect a firm's marginal cost of capital, which in turn, impacts future levels of realized cash flows and the present value of the stock prices would vary. In other words, changes in the interest rate affect the firm's market value because they influence the present value of the assets and liabilities in the firm's portfolio. And since variation of interest rates influence the return levels of investment instrument such as bond, the movement will also affect the discount rate. As a result, increase (decrease) in interest rates can lead to a declining (increasing) in earning per share (EPS) and to increase (decrease) in the opportunity cost of holding equity, then the value of common stock should decline (increase).

Alternatively, a monetary tightening might lower stock prices in that it adversely affects future cash flows. Bernanke and Gertler (1989) demonstrate that this effect can be important in two situations. First, firms have insufficient internally generated funds to finance new projects. Secondly, external funds are more expensive than internal funds. They argue that the premium on external funds is negatively related to a firm's collateral or net worth. Therefore, a monetary tightening, by reducing net worth, increases the cost of external financing and forces liquidity-constrained firms to operate at lower scale.

Several early studies find that the interest rates and equity share prices are generally negatively related. The empirical results of Joehnk and Petty (1980) suggest that stock prices are generally inversely responsive to interest rates. A similar result is found by Hafer (1986). He pointed out that an increase in interest rates generally reduces equity prices because the increase presages a tightening monetary policy. The empirical results of his study found that discount rate changes have significant negative effect on stock prices. Giovannini and Jorian (1987) found that increases in interest rates are associated with predictable increases in the volatility of returns in stock markets, and that expected returns in the stock market and in the foreign exchange market are negatively correlated with nominal interest rates. Thorbecke and Alami (1992) demonstrated that the funds rate is a priced factor in the arbitrage pricing model and that anticipated increases (decrease) in the funds rate lower (raise) share prices. Cheung (1997) examined the impact of US stock returns on Asian-Pacific stock return due to changes in US monetary policy in 1994. His findings suggest that monetary developments in the US can have a significant impact on Asian-Pacific stock returns, especially for those Asian-Pacific countries, which have strong economic links with the United States.

Most of the previous studies related to the present study concentrate only on the developed market such as the United States and European. No study has being carried out in Malaysia, particularly for the period immediately after the Asian financial crisis in 1997. During the period of 1997 through 2000, Bank Negara has twice imposed monetary easing, e.g., a decrease in the KLIBOR and Treasury Bill Rate.

The research contributes to the present literature in three distinct areas. First, the study uses not only composite index to measure the market returns but also the second board index and the eight sector indexes of Bursa Malaysia. This will shed some light on the magnitude of responsiveness of each sector on the interest rate change. Secondly, the study looks at the immediate effect on the relationship between interest rate and stock market returns following the Asian financial crisis. Finally, the study explores the long-run equilibrium as well as short-run interactions between the variables. This will help fund managers, individual investors and policymakers a better understanding of the behaviour, particularly of the short-run movements of interest rates and stock market.

The primary objective of the present study is to investigate the sensitivity of money market rates on stock returns in Malaysia following the Asian financial crisis. More specifically, this study aims to examine 1). The impact of the money market changes (increase and increase) on market stock returns. 2). The impact of the money market changes (decrease) on stock market returns in two different sub periods. 3) The respond of the money market changes on stock market returns using Second Board Composite Index of Bursa Malaysia and 4). The impact of the money market changes on stock market returns measured by eight sector indexes of Bursa Malaysia.

Overview of the Bursa Malaysia and KLIBOR

The companies on the Bursa Malaysia (BM) are listed either on the Main Board, Second Board or the Malaysian Exchange of Securities Dealing & Automated Quotation (MESDAQ). The BM computes an index for the main board, the second board and each of the main sectors traded on the bourse - construction, consumer product, finance, industrial product, plantation, properties, mining, and trading and services.

Kuala Lumpur Composite Index (KLCI) is calculated using 86 counters with 1986 as a base year. However, the selection of 100 counters from the Main Board was set in 1995 in view of its hefty trading and super-bull period. As the name implies, KLCI is a capitalization index which is weighted according to the market capitalization of the constituent stocks. In view of its strong composition and national index, KLCI has been used by the study as a benchmark for market stock returns in Malaysia.

The Second Board, which complements the Main Board, was established on 11 November 1988 to enable smaller companies with strong growth potential to be on the exchange. The KLIBOR or Kuala Lumpur Inter Bank Offered Rates is the interest rate charged or received on short-term funds in Malaysia. The KLIBOR has been used widely as a benchmark by Malaysian commercial banks and finance companies for pricing their lending rates to its corporate customers, notably base-lending rate (BLR).

Data and Methodology

The monthly data on Kuala Lumpur Interbank Offer Rates (KLIBOR) and the monthly closing of Kuala Lumpur Stock Composite Index (KLCI) and each of the sector indexes - construction, consumer product, finance, industrial product, plantation, properties, mining, and trading and services, from January 1, 1997 to December 31, 2000 are used. The KLIBOR were obtained from Bulletin of Bank Negara Malaysia (BMN) while the KLCI and the sectors indexes were obtained from the Bursa Malaysia.

To account for the effect of reduction in money market rates, on the stock market returns, during the sample period, the study partitions the sample into three sub sample periods. The starting date of sub period 1 is from January 1, 1997 to June 30 1998 was taken based on the beginning of Asian crisis, which occurred in 1997. The sub period 2 covered from June 30 1998 to April 30, 1999 which was the end of first monetary easing period to the start of second monetary easing period. In sub period 3, from April 30, 1999 to Dec 2000, the monetary authority reduced further the money market rates to the lowest ever at less than 4 percent. All time series data are transformed to natural logarithms prior to analysis.

To examine the sensitivity of money market on stock market return, the cointegration models of Engle and Granger (1987) and Johansen (1988) were used. The study also applies the error correction model and the Granger causality model to capture the cause effect relationships between these variables.

Engle Granger Cointegration Tests

Engle and Granger (1987) test was carried out to test for long-run equilibrium relation between two or more stationary variables. Consider two variables, stock composite index, S, and the interbank offer rates, I, used in the present study are said to be cointegrated if their difference $\varepsilon_t = \alpha S_t - \beta_t$ is I(0). The ε_t is the equilibrium error term and can be estimated from the cointegration equation as follows:

$$S_t = \alpha + \beta_t + \varepsilon_t \qquad (1)$$

To test for integration between the interbank offer rates and stock composite index, the study applies the ADF test procedures to the residual series, å$_t$ obtained from the equation (1). The null hypothesis of cointegration is rejected when the t-statistic is negative and greater in absolute value than the critical value reported in Engle and Yoo (1987).

Johansen Cointegration Tests

Since the series are integrated of order one, the number of significant cointegration vectors is tested following the procedure introduced by Johansen (1988, 1991) and Johansen and Juselius (1990). The model used the maximum likelihood-based -max and ë -trace statistics. In a set of m- series, if there are r cointegrating vectors, then there are (m-r) common stochastic trends. The present study tests for the presence of cointegration in the two variable vectors of interbank offer rates and the stock composite index.

Error Correction Model (ECM) and Causality Tests

The Engle Granger and Johansen cointegration tests only for long-run relation between variables. Granger suggests the use of ECM to examine the dynamic short-run relation and long-run equilibrium relation. The framework of ECM is also able to examine the Granger-causality relations between variables. The causation analyses between the time series supply short-run dynamic adjustments needed by each variable to reach positions of long-run equilibrium. The Granger representation theorem suggests the following joint error correction representation:

$$\Delta S_t = \alpha_0 + \phi_0 \mu_{t-1} + \sum_{i=1}^{m} \beta_i \Delta S_{t-i} + \sum_{j=1}^{n} \delta_j \Delta I_{t-j} + \upsilon_t \qquad (2)$$

$$\Delta I_t = \alpha_0 + \phi_1 \mu_{t-1} + \sum_{i=1}^{m} \chi_i \Delta S_{t-i} + \sum_{j=1}^{n} \xi_j \Delta I_{t-j} + \varepsilon_t \qquad (3)$$

where S_t and I_t denote the stock composite index and the interbank offer rates, respectively. The error correction term, $_t\propto_{t-1}$, is obtained from the cointegrating equation (1). The past value of error term in the equation has an impact on the changes of variables S_t and I_t. The u_t and ε_t are stationary random processes capturing other information not contained in either lagged value of S_t and I_t. Finally, the m and n are the optimal lag order to be determined using the final prediction error procedures proposed by Akaike (1969).

Short-run dynamics between these two variable are captured by the coefficients, δ_t and χ_1. If the coefficient, δ_t is nonzero and statistically significant, movements in interbank offer rates will have a short-run effect on the stock composite index. Similarly, if the coefficient χ_1 is nonzero, then the stock composite index has a short-run effect on interbank offer rates. The existence of a long-run relation in equations (2) and (3) is denoted by φ_1 and φ_2, respectively. After the appropriate lag structure is identified using Akaike 's minimum final prediction error, the study estimate the system represented by equation (2) and (3).

Empirical Results

The test results of the DF and ADF show that the null hypothesis of stationary of levels for KLIBOR, KLCI, 2nd Board and sector indexes series are rejected for all cases. However, the null hypothesis of stationarity for first difference cannot be rejected at 5 percent level. Thus, the present study noted that all data series are integrated of order one I(1), for full all the time series data. To determine whether the appropriate models are ECMs or VAR models, cointegration tests are necessary for those models containing variables that are non stationary but integrated to the same order. Both Engle-Granger and Johansen cointegration tests result were reported. The results of the Engle-Granger cointegration test results were reported in Table 1. The hypothesis of no integration cannot be rejected in all cases except for KLCI sub sample 2 and sector indexes of property and mining since their t-statistics were greater than the critical value at 10 percent level in absolute terms.

Results of applying the Johansen procedure, using optimal lag structure for the VAR, were reported in Tables 2 and 3. For KLCI full sample, the results suggested that there exist at most r = 2 cointegrating vectors for both max eigenvalue and trace value since the null of r d" 1 is rejected at the 90% critical value. Since there were two cointegrating vectors within the system, which implied that there existed (n-2) = 0 common trends between these variables. As for the sub samples, all results are similar to those of full sample except for the sub sample 2. In the sub sample 2, the results suggested that there existed at most r = 1 cointegrating vectors for both max eigenvalue and trace value since the null of r d" 1 is not rejected at the 95% critical value. As for 2nd Board and sector indexes, the null hypothesis of r d" 1 cannot be rejected at the 90% critical value for all cases except for constructions and properties of the sector indexes.

Thus, Johansen's maximum likelihood tests indicated the presence of cointegration for KLCI, sub samples, and construction and properties of the sector indexes while the Engle-Granger tests results indicate cointegration in sub sample 2 of KLCI and mining and properties of sector indexes. Both models produced almost the same results. These results suggested that there was a long-term relationship between KLIBOR and sub sample 2, KLIBOR and constructions, KLIBOR and properties and KLIBOR and mining. If the two time series are cointegrated, causality must exist in at least one direction.

Table 1: Cointegration Tests on Residuals

Variables KLCI	Dickey Fuller (DF)Test Statistic	Augmented Dickey Fuller (ADF)Test Statistic
Full Sample	-1.1145	-1.4568
Sub period 1	-0.9061	-0.8205
Sub period 2	-3.9455*	-3.6002*
Sub period 3	-2.5824	-1.5155
2nd Board	-2.0872	-2.3256
	SECTOR INDEXES	
Constructions	-2.0384	-2.3186
Consumer Products	-1.0547	-1.5401
Finance	-1.2270	-1.7469
Industrial Products	-1.4225	-1.8091
Plantations	-1.2395	-1.6279
Properties	-2.2238	-2.5862*
Mining	-2.0820	-2.4147*
Trading & Services	-0.9702	-1.4384

Notes: * Significant at 10 % level.

Table 2: Johansen and Juselius Cointegrating Test Results

Order of cointegration: Null (Alt.) hypothesis KLCI, 2nd BOARD and KLIBOR	Critical values (max eigenvalue)		Critical values (trace)	
Full Sample				
	λ max	90%	λ trace	90%
$r = 0$ ($r > 0$)	16.1001*	(15.8700)	30.0528*	(20.180)
$r \leq 1$ ($r > 1$)	14.2662*	(9.1600)	18.2662*	(9.1600)

Sub period 1				
r = 0 (r > 0)	21.1488*	(15.8700)	31.2846*	(20.1800)
r ≤ 1 (r > 1)	10.1357*	(9.1600)	9.1600*	(7.5300)
Sub period 2				
r = 0 (r > 0)	31.9134*	(15.8700)	33.4671*	(20.1800)
r ≤ 1 (r > 1)	1.5537	(9.1600)	1.5537	(9.1600)
Sub period 3				
r = 0 (r > 0)	32.222*	(15.8700)	45.3956*	(20.1800)
r ≤ 1 (r > 1)	13.1746*	(9.1600)	13.1746*	(9.1600)
2nd Board				
r = 0 (r > 0)	9.9003	13.8100	14.8633	17.880
r ≤ 1 (r > 1)	4.9630	7.5300	4.9630	7.5300

Notes: *Significant at 10% level and the critical value is in the parentheses. The r denotes the maximum number of cointegrating vectors.

Table 3: Johansen and Juselius Cointegrating Test Results

Order of cointegration: Null (Alt.) hypothesis SECTOR INDEXES and KLIBOR	Critical values (max eigenvalue)		Critical values (trace)	
Constructions				
	λ max	90%	λ trace	90%
r = 0 (r > 0)	14.699*	13.8100	18.319*	17.880
r ≤ 1 (r > 1)	3.6197	7.5300	3.6197	7.5300
Consumer Products				
r = 0 (r > 0)	13.3078	13.8100	16.374	17.880
r ≤ 1 (r > 1)	3.066	7.5300	16.374	7.5300
Finance				
r = 0 (r > 0)	12.794	13.8100	15.859	17.880
r ≤ 1 (r > 1)	3.0655	7.5300	3.0655	7.5300
Industrial Products				
r = 0 (r > 0)	10.957	13.8100	14.570	17.880
r ≤ 1 (r > 1)	3.6130	7.5300	3.6130	7.5300

Plantations					
	r = 0 (r > 0)	10.394	13.8100	13.965	17.880
	r ≤ 1 (r > 1)	3.5710	7.5300	3.5710	7.5300
Properties					
	r = 0 (r > 0)	15.582*	13.8100	19.8191*	17.880
	r ≤ 1 (r > 1)	4.2371	7.5300	4.2371	7.5300
Mining					
	r = 0 (r > 0)	14.678*	13.8100	17.501	17.880
	r ≤ 1 (r > 1)	2.8231	7.5300	2.8231	7.5300
Trading & Services					
	r = 0 (r > 0)	12.278	13.8100	14.684	17.880
	r ≤ 1 (r > 1)	2.4062	7.5300	2.4062	7.5300

*Significant at 10% level and the critical value is in the parentheses. Critical value is in the parentheses. The r denotes the maximum number of cointegrating vectors.

The ECM estimation results for full period show insignificant negative long-run relation between the KLIBOR and KLCI for both directions, suggesting that an increase in stock index has a negative effect on the interest rates. This result also indicates that innovation in one variable is not transmitted to other variable. This means that KLIBOR and KLCI are not bound together in one long-run equilibrium relation. The KLIBOR follow and adjust to innovations in the KLCI. The results of short-run interactions for the relationship between the KLCI full sample and sub periods, and the KLIBOR do not support the existence of short-run relations between KLIBOR and KLCI for the full sample as well as sub periods.

The results also show that there is no evidence of cointegration between sectors indexes and KLIBOR, for all cases, either long-run or short-run. It is quite surprising to see the sector indexes such as properties, constructions and mining do not exhibit cointegration using the ECM procedures, the same way as it has shown in the Engle-Granger and Johansen models. The causality between the variables also cannot be established in any case, indicating that interest rates or KLIBOR for that matter has any influence on the KLCI, 2nd Board or sector indexes.

Conclusion and Directions for Future Research

During the middle of 1998 and 1999, the monetary authority of Malaysia twice eases the money market rate to the lowest ever. This significant switch of the monetary policy is to spur the economic activities after experiencing slow economic growth (during the financial crisis) in the late 1997 and early 1998. Following this event, the present study examines the sensitivity of easing monetary policy on the stock return during 1997 through 2000.

We use Kuala Lumpur Composite Index as proxy for stock returns and Kuala Lumpur Interbank Offer Rate as proxy for money market rate. In addition, we use the sector indexes to investigate the impact of changes in interest has on these variables. Two cointegration models are used. They are Engle-Granger and Johansen. These models test for the long-run integration between the variables. The study also employs Error Correction Model to test for the short-run and causal relationship of the variables. The empirical results suggest insignificant long-run interaction between Malaysian money market and stock market for the full sample.

In addition, the study shows long-run relationship only between three sector indexes which are properties, constructions and mining sectors with the KLIBOR. For the short-run relationship, we find no short-term and well as causality relationship between KLCI and the KLIBOR, and between the sector indexes and the KLIBOR. The present study suggests that easing monetary policy does not on average stimulate stock market activity as such. Other factors may have strong influence on stock market such as the low level of confidence on the part of foreign investors on the Malaysian stock market.

It should be recalled that, in our study, we use only interest rates to gauge its impact on the stock returns. However, as argued by Swanson (2002), economic conditions rather than interest rates were helping to drive equity prices. Therefore, in future research, other economic variables such as exchange rates, inflation rates and economic growth could perhaps be used to investigate their impact on stock returns. Another potential future research is to use highly frequency data such as weekly or quarterly of interest rates and stock returns.

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