Sunway College Journal 1, 21–27(2004)

INTER-COUNTER LINKAGE IN KUALA LUMPUR STOCK EXCHANGE RETURNS

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ABSTRACT

This paper investigates the linkages among daily returns of the Kuala Lumpur Stock Exchange (KLSE) counters over the period 7 July 1995 to10 August 1999. It examines the dynamic causal linkages among nine counters and then quantifies the extent of their dynamic interdependencies through the application of time series econometric technique of Granger causality tests. The counters selected are mining, consumer product, finance, industrials, industrial product, properties, construction, plantations, and trading/services. The findings successfully establish the existence of inter-linkages among the nine selected counters.

Key words: Granger Causality, KLSE, unit root.

INTRODUCTION

This paper examines the possible dynamic causal linkages that exist among nine selected counters of the Kuala Lumpur Stock Exchange (KLSE) consisting of mining, consumer product, finance, industrial, industrial product, properties, construction, plantation, and trading/services, using end-of-day (daily returns) from 7 July 1995 to 10 August 1999. This period was chosen due to the availability of data for all selected counters.

In order to preserve the financial integrity of the market and enhance investor protection from manipulative activities of speculators and managements of companies, the Securities Commission was formed in March 1993 and the Main Board sectors were revamped. This resulted in a regrouping of the companies into 9 separate sectors. The significance of the nine counters is shown in Table 1. It shows that 60 per cent of its component companies are from the consumer product, industrial product, trading and services and construction sectors. The KLSE composite and the Exchange Main Board All Share (EMAS) are among the popular market barometers.

The base year for all the sectoral properties was 1970. The KLSE Finance Index comprises 56 companies, the properties index 63 companies, the Mining Index 10 companies and the Plantation Index 40 companies at end of 1996. The NST Industrial Index is composed of 30 stocks from the industrial sector, and the price-weighted index is constructed in much the same manner as the Dow Jones Industrial Average for the New York shares.

Recently, investors have expressed an increasing interest in the performance of the nine counters selected in the KLSE stock market. Such interest has resulted in the nine growth

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sectors becoming alternatives for agents looking to diversify their risks in choosing the right investments in the financial market. The efficient-market theory documents that the stock market movement is essentially random, whereby the price of a stock shows no predictable pattern. However, Tang and Faoziah (2001) found that KLSE returns were predictable, indicating inefficiencies of the market over the sample period of 2 January 1990 to 30 July 1999.

Table 1. Sectorial Composition of EMAS and KLSE Composite Index

Sector	EMAS Index		KLSE CI	
	No.	%	No.	%
Consumer Product	57	14	16	16
Industrial	85	21	23	23
Construction	24	6	7	7
Trading/Services	67	16	16	16
Finance	56	14	14	14
Hotel	6	1	2	2
Properties	63	15	15	15
Plantation	40	10	6	6
Mining	10	2	1	1
Trust	3	0.7	--	--

Source: Ariff, Shamsher, & Annuar (1998).

Interest in this area has been displayed by a number of studies concentrating on the linkages between the markets of developed countries and Asia. Ho and Cheung (1991), for instance, discovered the instability between the co-movements of developed Asian-Pacific markets. It is now widely recognized in the financial literature that interrelationships exist among major financial stock markets of developed countries (Grubel, 1968; Lessard, 1973; Ripley, 1973; Hillard, 1979). While earlier studies used simple regression or correlation techniques using stock market indices, recent developments in the time series econometric literature have permitted more rigorous analyses which emphasize both the short- and long-run co-movement among a number of time series. Unfortunately, there is a lack of studies of inter-counter linkage returns in the stock market in Malaysia.

DATA SOURCES AND VARIABLES

The daily closing stock prices P_t of the KLSE counters were retrieved from Sequencer, version 1.4.0 (Financial Times Information). The sample period was from 7 July 1995 to 10 August 1999, yielding 1001 observations (excluding holidays and no-trading days). That the observation date started on 7 July 1995 was due to the availability of the sample data for the nine selected counters. The daily closing returns (R_t) were calculated from $R_t = 100*\log (P_t / P_{t-1})$ (Cheung and Coutts, 1999). The plots of the nine counters' daily returns are shown in Appendix A.

Table 2. Descriptive Statistics: Daily Closing Returns (%) of KLSE Counters

	Mining	Cons. Prod.	Fin.	Indust.	Indust. Prod.	Proper.	Const.	Plant.	Trad./ Serv.
Mean	–0.04	–0.01	–0.02	–0.02	–0.03	–0.04	–0.03	–0.03	–0.02
Median	–0.10	–0.02	–0.03	–0.03	–0.04	–0.09	–0.01	–0.05	–0.03
Maximum	13.35	7.00	9.83	7.49	8.24	9.08	10.39	6.62	9.72
Minimum	–18.26	–7.16	–8.93	–9.86	–10.77	–8.22	–9.89	–7.23	–9.16
Std. Dev.	1.65	0.80	1.15	0.93	0.99	1.13	1.33	0.81	1.10
Skewness	–0.15	0.35	1.23	–0.08	–0.59	0.84	0.89	0.07	0.95
Kurtosis	27.30	27.67	19.74	30.22	28.14	16.14	19.04	18.42	21.19
Jarque-Bera	24636	25409	11942	30898	26412	7316	10859	9924	13957
Probability (p) value	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)

Key:

Cons. Prod.	=	Consumer product	Proper	=	Property
Fin.	=	Finance	Const.	=	Construction
Indust.	=	Industrials	Plant.	=	Plantation
Indust. Prod.	=	Industrial Product	Trad./Serv.	=	Trading/Services

The results of the stock returns using respective descriptive statistics are shown in Table 2. As measured by average values (mean and median), the daily returns were negative. In fact, a study by Tang and Faoziah (2001) revealed that by average, half the months of a particular year showed negative returns for February, March, June, July, August and November. The lowest average monthly return was in August (−0.148 percent significant at 5 percent level). As shown in Table 2, a non-normal distribution appears for various counters' returns. The Jarque-Bera normality test rejects the null of normal distribution for all cases (p-values are zero). However, Cheung and Coutts (1999) note that evidence suggests that security returns are non-normal.

Various testing procedures were employed. For example, by using the stationary of the series, Standard Granger causality test (Granger, 1988) was applied and it was only valid for stationary series, I(0). A number series would be stationary if it had a tendency to move to a fixed mean over time. In order to identify the integrated order, I(d) of the series was conducted using the semi-parametric type tests developed by Phillips and Perron (1988) as convenient testing procedures. Both are based on the null hypothesis that a unit root test (PP) exists in the auto regressive representation of the time series. The PP test tries to account for dependent and IID processes by adopting a non-parametric adjustment; hence it can eliminate any nuisance parameters. It is also designed to be robust for the presence of autocorrelation and heteroscedasticity. The regression equation for the PP [AR(1) process] is given as $\Delta Y_t = a + bY_{t-1} + e_t$,where Δ is first difference operator, e_t is the regression error assumed to be stationary with zero mean and constant variance. The tests are carried out to reject the null hypothesis of a unit root (b = 1). The unit root equation is tested against time trend. The results of stationary test (unit root) are reported in Table 3, and they confirm that all series (counters) are stationary, I(0). Thus, the use of standard Granger causality (Granger, 1969) test was found applicable.

Table 3. Results of Phillip & Perron (1988) Unit Root Test (KLSE Daily Returns)

Variables	Unit root Statistics (null of a unit root)
Finance	–27.89
Mining	–33.54
Consumer Product	–28.02
Industrials	–31.30
Industrial Product	–32.91
Properties	–29.49
Construction	–28.22
Plantations	–30.10
Trading/Services	–30.94

Note: MacKinnon, (1991) critical value at 1% level is –3.9722. The truncation lag is six.

GRANGER CAUSALITY ANALYSIS

In the econometric literature, there exists a menu of alternative estimation methods, which permit valid testing of causal inference in theoretically postulated models and systems that are known to be integrated. Correlation, of course, does not necessarily imply causation in any meaningful sense of the word. The econometric graveyard is full of magnificent correlations that are simply spurious or meaningless (Eviews 3). As for the efficient-market hypothesis (EMH), there may not necessarily be a real association between market efficiency and co-integration. Granger (1988) argues that co-integration between two prices imply an inefficient market as the error correction model indicates that at least one of the prices is predictable. Therefore, the Granger-type causality procedure (Granger,1969 and 1988) was applied to determine the direction of causation among the counters in KLSE. The causality procedure was conducted based on a bivariate system [x, y]. This approach was adopted because of its simplicity and because the data series in use were stationary. Granger (1969) simplified the definition of causality as "x is a Granger cause of y," denoted as $x \rightarrow y$, if present y can be predicted with better accuracy by using past values of x rather than by not doing so, other information being identical. In short, Granger causality measures precedence and information content among x and y. The standard causality specifications (1) and (2) were used in this paper.

$$y_t = c + \sum_{i=1}^{n} b_1 x_{t-i} + \sum_{i=1}^{n} b_{2i} y_{t-i} + u_t \quad (1)$$

$$x_t = c' + \sum_{i=1}^{n} b'_1 y_{t-i} + \sum_{i=1}^{n} b'_{2i} x_{t-i} + u'_t \quad (2)$$

The null hypothesis for equation (1) is that "x does not Granger cause y." This hypothesis would be rejected if the coefficients of the lagged xs were jointly significant (different from zero). The null hypothesis for equation (2) is that "y does not Granger cause x." This hypothesis would be rejected if the coefficients of the lagged ys were jointly significant. If both of these null hypotheses are rejected, then a bidirectional relationship ($x \leftrightarrow y$) is said to exist between the two variables. The causality patterns can be unidirectional causality, $x(y) \rightarrow y(x)$.

Table 4. Direction of Granger Causality

1. Bidirectional Causality	**2. Unidirectional Causality**
Construction ↔ Consumer Product	Consumer Product → Mining
Construction ↔ Properties	Consumer Product → Industrials
Construction ↔ Plantation	Consumer Product → Industrial Product
Consumer Product ↔ Plantations	Consumer Product → Trading/Services
Finance ↔ Mining	Construction → Mining
Finance ↔ Consumer Product	Finance → Construction
Finance ↔ Industrials	Industrials → Mining
Finance ↔ Industrial Product	Industrial Product → Mining
Finance ↔ Properties	Mining → Properties
Finance ↔ Plantations	Plantations → Mining
Finance ↔ Trading/Services	Trading/Services → Construction
Mining ↔ Trading/Services	
Properties ↔ Consumer Product	**3. No Causality**
Properties ↔ Plantations	Trading/Services ↮ Industrial Product
Properties ↔ Trading/Services	
Plantation ↔ Trading/Services	
Industrial Product ↔ Industrials	
Industrial Product ↔ Properties	
Industrial Product ↔ Construction	
Industrial Product ↔ Plantations	
Industrials ↔ Properties	
Industrials ↔ Construction	
Industrials ↔ Plantations	
Industrials ↔ Trading/Services	

→ is unidirectional causality and ↔ is bidirectional causality based on F-statistic (Wald test) of jointly significant of b_1 (equation 1) and b'_1 (equation 2) at 10 per cent significance level. No causality is made for the insignificant of F-statistic at 10 per cent significance level. The F-statistics for the above Granger causality were computed using Eviews statistical software and are not reported here due to the space availability.

The results of Granger causality analysis are reported in Table 4[1]. The optimum lag length in Vector Auto Regression (VAR) is five days by minimizing Akaike Information Criterion (AIC). We do not report the AIC statistics here due to the space availability. The

[1] A battery of diagnostic statistics like autoregressive conditional heteroskedastic (ARCH) test for ARCH effect, Jarque-Bera test for normality, Ramsey RESET test for misspecification, Breusch-Godfrey Lagrange multiplier test for general, high-order, ARMA errors are not performed in this study. However, it may not affect the results since the Granger causality equations (1) and (2) used in this study are the standard one that are based on the specification proposed in Granger (1986). In addition, the time series used in this study are stationary. Thus, Ordinary Least Squares (OLS) estimates are valid (Engle and Granger, 1987).

results reveal that at least one direction exists among the counters' returns in KLSE. An exception is for Trading/Services and Industrial Product where no causality was found among the variables. In sum, most of the returns of KLSE counters are linked with one another. This indicates that the returns of a counter are predictable using the past returns of another counter.

CONCLUSION

This empirical study investigated the linkages among daily stock returns of the nine Kuala Lumpur Stock Exchange (KLSE) counters over the period 7 July 1995 to 10 August 1999. Substantially, the results of the counters' returns were found to be stationary. This study also documented the presence of inter-counter linkages of KLSE returns. The evidence of causal linkages among the nine counters implies that since each of the stock sectors contains information on the common stochastic trend (which binds all these counters together), the predictability of one sector stock can be enhanced significantly by utilizing information on other sector stock prices.

No empirical study is free from limitations. The Granger causality test (Granger, 1969) used in this study is essentially out of date. For future study, a recently developed causality test, Modified Wald (MWALD) test proposed by Toda and Yamamoto (1995) will be used to provide complementary evidence and to check the consistency of the findings in this study.

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Appendix A. Plot of KLSE Counter Returns, 17/7/95– 10/8/99