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Derivatives Trading and Volatility Spill-Over: Evidence from a Developing Derivatives Market

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ABSTRACT

The objective of the paper is to ascertain the influence of shares derivatives trading on the Malaysian stock market. Johansen-Juselius' co-integration test reveals signs of increasing integration between these cash and futures markets over time. The Granger causality test indicates that the stock index futures Granger causes the cash index with no feedback in the reverse direction during periods of financial crisis and recovery. Significantly observable during the period was high participation of foreign investors in the futures market. The increase in the number of foreign investors in the futures market dramatically increases the herding activities in futures market trading. The findings suggest that the transmission of information from the futures market to the cash market could, to a certain extent, during a period of "bad economy", be due to herding by foreign investors.

Keywords: Derivatives trading, cash market, volatility spill-over and developing derivatives market

INTRODUCTION

The introduction of the derivatives market cantract is one of the significant innovations in the emerging stock markets of the 1980s and the 1990s. The economic functions of the contract for example are to diversify financial risk through hedging strategies and to facilitate the process of price discovery. Hedging through futures trading is a process used to reduce uncertainty induced by adverse price changes in the cash marketindices. The introduction of stock index futures contract offers portfolio managers an opportunity to manage portfolio market risk without changing the portfolio composition. The stock index futures is preferred as a hedging vehicle because of its speed, liquidity and lower transaction cost on brokerage commissions and bid and asked spread (Drimbetas *et al*., 2007; Ghosh, 1993).

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Economic agents involved in the cash market trading are subjected to a wide range of risks associated with movements in the spot prices. A key factor in the development of the futures markets is the demand for hedging facilities. In line with the Malaysian Government's aim of establishing Kuala Lumpur as the Asia Pacific region's premier financial centre, on 15 December 1995, the Kuala Lumpur Option and Financial Futures Exchange (KLOFFE) was established. Derivative instruments such as option[1] and stock index futures are offered by the KLOFFE, in which the basis is the Kuala Lumpur Stock Exchange (KLSE)[2] Composite Index. Having these hedging facilities in the Kuala Lumpur Stock Exchange, allows portfolio managers and investors to better manage their risk exposure and exploit the full potential of the tools for effective risk and portfolio management.

In mid 1997, the currency crisis hit Asian countries including Malaysia. The roots of the crisis can be traced to the speculative activity on Thai Baht in mid-May 1997. The Malaysian stock market began its sharp downward trend not long after the Thai Baht crisis. In July of the same year, the KLCI (Kuala Lumpur Composite Index) broke through the lowest psychological level. The futures market during that period exhibited the strongest correlation with the cash market. The correlation was so significant that many analysts suspected there was a lead and lag relationship between these two markets, and that the futures index was the leading factor. As seen from the observations of the index movement in the cash market during the crisis period, the continued decline each day of the futures index would be followed by a definitive decline in the cash market composite index in the following few day. Could this phenomenon depict that the trading in the futures market has a causal effect on the cash market in Malaysia?

Based on their findings, Lemmon and Ni (2008) and Hodgson and Nicholls (1991) have shown that higher volatility in the futures markets is caused by more highly levered and speculative participants. This may be a significant contributing factor in increasing the volatility of the cash market in Malaysia. An increase in spot market volatility may result in an increase in cost of capital and real interest rates, leading to a decline in the value of investments and investors' share market loss of confidence. In the study by Kasman and Kasman (2008), and Stoll and Whaley (1990), it was suggested that the stock index futures, index arbitrage and program trading are to blame for the excessive stock market price swings.

A study on the impact of the introduction of financial futures index on the cash market in Germany, Japan, Spain, Switzerland, the UK and the US was carried out by Antoniou et. al (1998). In the study, an analysis was conducted using data over a three-year period prior to the introduction of futures trading. Overall results for all countries in this study

[1]The option was launched by the KLOFFE in the office of the Kuala Lumpur Stock Exchange in December 2000.

[2]The Kuala Lumpur Stock Exchange is now referred to as Bursa Malaysia.

showed that the introduction of futures had not had an unfavorable effect on the cash market. As a matter of fact, it appeared that there had been an improvement in the way the news was transmitted into prices following the introduction of futures trading. Thus, the researchers believed that market turbulence as a result of the introduction of derivative trading appeared unfounded. Consequently, calls for further regulation of futures markets based on this view were deemed injudicious.

At the Kuala Lumpur Stock Exchange the usefulness of the futures market during the crisis as a hedging function was questioned. Was there a possibility that the investors used the futures market to influence the cash market? If so, trading in the futures market can create a negative feedback to the cash market and increase the latter's volatility. Such speculative activities, therefore, merit further regulation of the futures market.

The objectives of this paper are to examine the relationship between the cash market and the futures market of the KLSE. Specifically, the objective is to determine whether derivatives in the futures market exert a destabilising influence on the cash market during a financial crisis. The paper is divided into four sections. The first section is this Introduction. The methodological framework employed and sources of data are discussed in the second section. The estimated results and discussion are reported in third, and last section presents some concluding remarks.

METHODOLOGY AND DATA

The daily closing values of the Kuala Lumpur Stock Exchange Composite Index (CI) and the Kuala Lumpur Stock Exchange Composite Index Futures contract (CIF), spanning from January 1996 to June 2000 are employed as the main variables in this study. The Daily Dairy, published by the Kuala Lumpur Stock Exchange is the major source for these data. The analysis is conducted over three sub-sample periods, namely: before the financial crisis period (Jan 1996 – Jun 1997); during the crisis period (Jul 1997 – Aug 1998) and during the recovery period (Sep 1998 – Jun 2000), which saw the oversight of selective capital control measures. .

Methodology

In order to investigate the relationship between the CI and CIF, this study employed the vector autoregressive (VAR) model. The VAR model can be presented as:

$$\begin{bmatrix} CI_t \\ CIF_t \end{bmatrix} = \begin{bmatrix} \alpha_1 \\ \alpha_2 \end{bmatrix} + \begin{bmatrix} \beta_{1,1}(L) & \beta_{1,2}(L) \\ \beta_{2,1}(L) & \beta_{2,2}(L) \end{bmatrix} \begin{bmatrix} CI_t \\ CIF_t \end{bmatrix} + \begin{bmatrix} \varepsilon_1 \\ \varepsilon_2 \end{bmatrix} \quad (1)$$

where CI denotes the Kuala Lumpur Stock Exchange Composite Index; and CIF is the Composite Index Futures contract.

The co-integration test is employed to investigate the long-run relationship between both variables, CI and CIF. Prior to testing

for co-integration however, the individual variables' time-series properties should be investigated. If the variables are found to be stationary, the appropriate procedures to follow would be the conventional regression procedures. But, if the variables are found to be non-stationary, with means and variances that are time-dependent, then to establish the long-run relationships, the co-integration test is necessary. Testing the stationary level of the variables is done using the unit root tests method introduced by Augmented Dickey-Fuller (1979) and Phillips-Perron (1988).

If the two variables are non-stationary and integrated of the same order, then to estimate the relationship of these two variables, the co-integration method suggested by Johansen (1988) and Johansen and Juselius (1990) can be employed. The co-integration method (see Engle and Granger, 1987) is described as a long-run relationship between the variables, and it implies that deviations from equilibrium are stationary, with finite variance, even though the series itself is non-stationary and has infinite variance. The Johansen and Juselius (1990) procedure provides the appropriate test statistics to test the hypothesis for the number of co-integrating vectors and tests of restriction upon the coefficients of the vectors.

The Johansen procedure involves the identification of rank of the *m* by *m* matrix Π in the specification given by

$$\Delta X_t = \delta + \sum_{i=1}^{k-1} \Gamma_i \Delta X_{t-i} + \Pi X_{t-k} + \varepsilon_t \quad (2)$$

where X_t is a column vector of the *m* variables, Γ and Π correspond to coefficient matrices, Δ is a difference operator, k denotes the lag length, and δ is a constant. In the case of no co-integration, Π is treated as a singular matrix (its rank, r = 0). Hence, in a co-integrated case, the rank of Π could be anywhere between zero. For the rank of Π, the procedure provides two likelihood ration (LR) tests, namely, the trace statistics and maximum Eigen value (λ-max).

If two variables move together in the long-run equilibrium, the short-run Granger causality tests should be constructed within a vector error-correction model (VECM) to avoid misspecification (see Granger 1988)[3]. Otherwise, the standard vector autoregressive (VAR) model[4] may be applied in the analysis. The vector error-correction model (VECM) derived from the long-run co-integrating vectors can be used to detect the direction of the Granger-causal effect running from one variable to another. The VECM model employed for the testing of Granger-causality across various variables can be represented by:

$$X_t = \begin{pmatrix} CI_t \\ CIF_t \end{pmatrix} = \begin{pmatrix} \alpha_1 \\ \alpha_2 \end{pmatrix}.$$

[3]If the variables in a system are co-integrated, then the short-run analysis of the system should incorporate the error-correction term (ECT) to model the adjustment for the deviation from its long-run equilibrium.

[4]When an ECT is added to the vector autoregressive model (VAR), the modified model is referred to as the vector error-correction model (VECM). VECM is thus a special case of VAR.

$$+\begin{pmatrix}\beta_{11}(L) & \beta_{12}(L)\\ \beta_{21}(L) & \beta_{22}(L)\end{pmatrix}\begin{pmatrix}\Delta CI_t\\ \Delta CIF_t\end{pmatrix}$$

$$+\begin{pmatrix}\gamma_1 z_{1,t-1}\\ \gamma_2 z_{2,t-1}\end{pmatrix}+\begin{pmatrix}\Phi(L) & 0\\ 0 & \Phi(L)\end{pmatrix}\begin{pmatrix}\varepsilon_{1,t}\\ \varepsilon_{2,t}\end{pmatrix} \quad (3)$$

where X_t is a (2 x 1) vector of the variables in the system, α corresponds to a vector of constant terms, Δ is a difference operator, β is the estimable parameter, β(L) and $\Phi(L)$ are finite polynomials in the lag operator, z_{t-1} is the error-correction term, L is a lag operator and ε_t is the disturbances.

The short-run Granger causality test is executed by calculating the F-statistic based on the null hypothesis that the set of coefficients on the lagged values of independent variables (in first difference except for the I(0) variable, which will be in its level) are not statistically different from zero. In the event that the null hypothesis is not rejected, then it can be concluded that there is no causal effect between the independent variable and the dependent variable. In addition to the detection of the short-run causal effects, the VECM also enables us to examine the effective adjustment towards equilibrium in the long run through the significance or otherwise of the *t*-test of the lagged error-correction terms (ECT) of the equation.

ESTIMATION RESULTS

Integration and Co-integration Tests

Presented in table 1 are the results of the ADF and PP unit root tests for the CI and CIF in levels and the first differences. As indicated in the results the null hypothesis of a unit root could not be rejected for both variables in levels in the three sub-sample periods. The null hypothesis of a unit root, however, was rejected for the first differences in the three sub-sample periods. This indicates that all the variables are stationary in their first differences, or I(1). As a result, all these variables should appear in first difference in stationary form in the causality tests within the VAR/VECM framework.

Reported in table 2 are the results of bivariate co-integration tests using the method introduced by Johansen (1988), Johansen and Juselius (1990). The test results indicate that there is one co-integrating vector in the system for the different sample periods. This means that both variables have a tendency to move together in the long-run. This test also establishes the existence of the long-run co-integration relationship between CI and CIF since both variables reveal very high correlation[5] (see Fig.1a). Even though within the short sample period, the long-run relationship is already established for both CI and CIF.

Granger Causality Tests

As indicated by the co-integration test results in Table 2, both CI and CIF are co-integrated. Thus, this warrants further analysis in order to determine the short-run and long-run dynamic relationships

[5]The correlation between CI and CIF before the crisis, during the crisis and during the crisis under selective capital control measures are 0.9940, 0.9977, 0.9980 respectively.

TABLE 1
Results of Unit Root Tests

	Test Statistics			
	Augmented Dickey-Fuller test		Phillips-Perron test	
Variables	Constant without trend	Constant with trend	Constant without trend	Constant with trend
		Level		
Before crisis				
CI	-1.7889 (7)	-1.2748 (7)	-2.6916 (1)	-2.1504 (1)
CIF	-1.8279 (7)	-1.3967 (7)	-2.5961 (1)	-2.1207 (1)
During crisis				
CI	-0.3256 (1)	-1.6791 (1)	-0.1991 (1)	-1.5097 (1)
CIF	-0.4319 (0)	-1.8099 (0)	-0.4270 (1)	-1.8188 (1)
Recovery				
CI	-2.3875 (5)	-1.9974 (1)	-2.0486 (1)	-2.8315 (1)
CIF	-1.6318 (4)	-0.5013 (4)	-2.5606 (1)	-2.7853 (1)
		First Difference		
Before crisis				
CI	-2.9408 (19)*	-3.1978 (19)	-16.267 (1)*	-16.365 (1)*
CIF	-2.9685 (19)*	-3.2173 (19)	-17.361 (1)*	-17.449 (1)*
During crisis				
CI	-4.3891 (14)*	-4.4345 (14)*	-14.579 (1)*	-14.572 (1)*
CIF	-3.8472 (16)*	-3.8758 (16)*	-17.012 (1)*	-16.996 (1)*
Recovery				
CI	-7.3590 (6)*	-7.4962 (6)*	-23.732 (1)*	-23.973 (1)*
CIF	-5.8139 (10)*	-5.9799 (10)*	-27.010 (1)*	-27.208 (1)*

Note: The critical values for rejection of ADF tests and PP tests are -2.86 and -3.41 at a significant level of 5 %, where a constant without and a constant with a time trend are included in the equation. The asterisk * indicates rejection of the null at 5 % significance level. Numbers in parentheses indicate the lag length to ensure residual whiteness.

between both variables within the vector error-correction model (VECM). The results of the causality test under the framework of VECM are presented in Table 3.

The short-run causality tests for the period before the crisis indicate that the CIF was not causing the CI and vice-versa. This could be due to the nature of the financial futures trading at that time which was still at the infant stage. As a 'young' financial futures market, the market is still mired in a grinding step-by-step battle to win approval from the investors to participate in the derivatives market. Perhaps investors still could not see the benefit of futures trading at that time and the lack of knowledge of its usefulness as a hedging instrument. As a result, the transaction volume was persistently low over the period before crisis (See Fig.1b).

However, the short-run causal effect running from CIF to CI is detected during

TABLE 2
Johansen's Test for Co-Integrating Vectors

H_0	Maximum Eigen value	Critical Value 95%	Trace	Critical Value 95%
Full sample period (k = 10)				
p = 0	32.17**	14.1	33.6**	15.4
p ≤ 1	2.32	3.8	2.32	3.8
Before crisis (k = 8)				
p = 0	20.57**	14.1	23.9**	15.4
p ≤ 1	3.33	3.8	3.33	3.8
During crisis (k = 2)				
p = 0	35.76**	14.1	35.84**	15.4
p ≤ 1	0.08	3.8	0.08	3.8
Recovery (k = 10)				
p = 0	29.77**	14.1	34.23**	15.4
p ≤ 1	2.46	3.8	2.46	3.8

Note: p indicates the number of co-integrating vectors. The (*) indicates rejection at the 95% critical values. The optimal lag-structure (k) is determined through the likelihood ratio test. Critical values are tabulated in Osterwald-Lenum (1992).

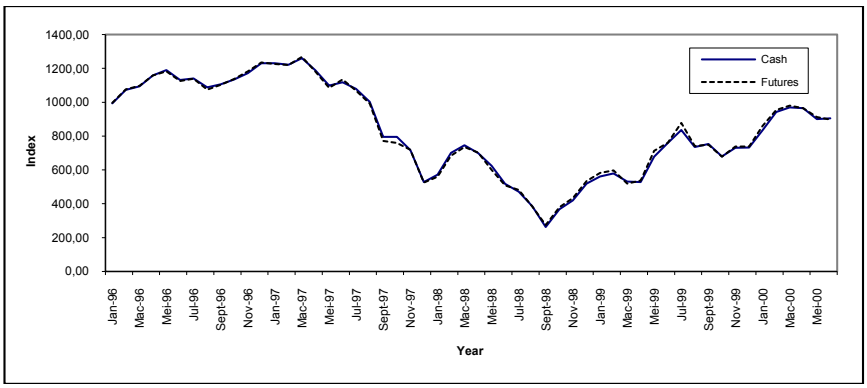

Fig.1(a): Daily KLSE Composite Index and Composite Index Futures

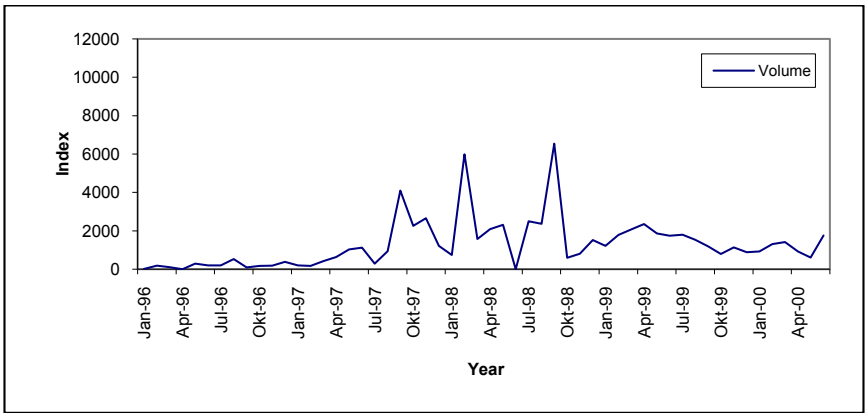

Fig.1(b): Daily Futures Volume in KLSE

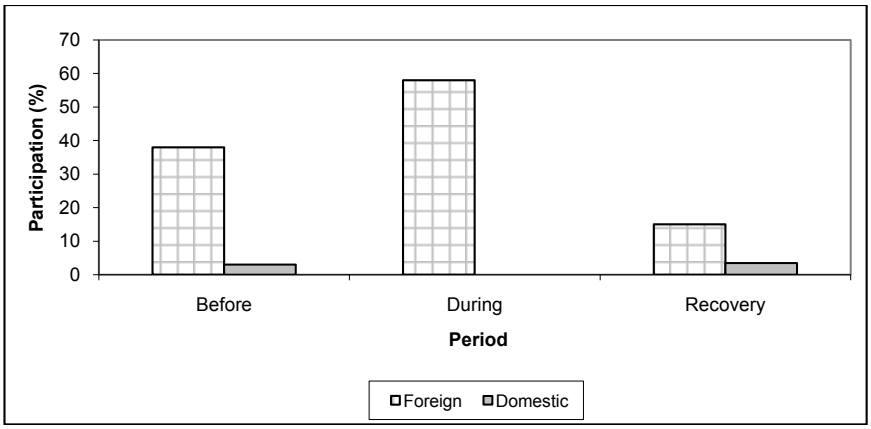

Fig.1(c): Market Demography of Futures Market Between Foreign and Domestic Institutions

the crisis period. It is alleged that the unidirectional causality effect has led to a major decline in cash market performance. The observation highlights that the volume traded for the futures contract increased significantly during the crisis period and showed a significant correlation between these two markets over the same period. This leads us to conclude that trading in index futures may have played a significant role during the KLSE stock market turbulence of 1997. Furthermore, we also suspect that the increase in transaction volume during that period was caused by massive selling transactions.

Due to the Asian financial turmoil, selective capital control measures were introduced in September 1998 to give Malaysia breathing space for its reforms to work. This included pegging the ringgit at RM3.80 to the US dollar, the convertibility of the Ringgit abroad, a moratorium on the outflow of capital and profits for 12 months and restrictions on exporting Malaysian currency. As shown in Fig.1(a), the CI reveals an upward trend after the implementation of capital control, indicating a positive response from the investment sectors towards the control measures. During this period, the Granger causality results reveal that the CIF has a similar unidirectional influence on the CI just as it did during the crisis.

In the case of the recovery period, it is suspected that the confidence in the market returned and the investors at KLSE were buying instead of selling the futures contract and this stimulated the cash market. It is also suspected that the investors may have regained their confidence, and this time, were buying futures contracts for normal hedging purposes. The lower volume of trading in the futures market during this recovery period was perhaps due to investors approaching the market more cautiously. The buying of futures derivatives for hedging purposes as a result created stability in the cash market. This is consistent with the efficient market hypothesis suggested by Fama (1970). According to Fama, this trend indicates that as the KLSE market matures, it slowly becomes more rational.

The overall result thus reveals that the CIF was a more significant influence on the CI during the financial crisis period. Table 3 displays the error-correction coefficient (ECT) and measures the degree to which the one-period response of each of the endogenous variables to a deviation from the equilibrium is corrected. These terms are statistically significant during a crisis period when the independent variable is CI, implying that futures adjust to short-run deviations from a long-run equilibrium. This verifies the long-run relationship between CI and CIF. This estimate seems to suggest high speed, with around 32 % occurring during the crisis under the selective capital control period, 27 % during the crisis period and 13 % during the period before the crisis.

As shown by the estimated results, the futures market Granger cause led to the cash market. What could be the underlying factors that explain such a relationship? A variety of factors have been put forward to explain the lead-lag and the causal relationship. Perhaps the best explanation for the Malaysian case would be the herding factor. In the context of a capital market, herding is trading by a group of investors in the same direction over a certain period of time. In Malaysia it has been documented that futures market trading was mostly done by foreign institutional investors, who are more sophisticated and more informed than ordinary local traders. Hence, they tend to react to any information more efficiently. Due to the fact, local traders would normally watch the action taken by these foreign investors and then react to that (Nofsiger & Richard, 1999). The results in Table 3 show that during the crisis period, the Granger cause between

TABLE 3
Granger Causality Test with Vector Error-Correction Model Results

Dependent Variables		Independent Variables	
	ΔCI F-statistics	ΔCIF Coefficient (Significant levels)	ECT[$\varepsilon_{1,t-1}$] (t-statistics)
Before Crisis (k = 8)			
ΔCI	1.2529	1.2193	-0.0984
	(0.2674)	(0.2865)	(-0.9312)
ΔCIF	1.3776	1.0632	-0.1256
	(0.2050)	(0.3884)	(-1.0812)
During Crisis (k = 2)			
ΔCI	5.4474***	8.9608***	-0.0166
	(0.0047)	(0.0002)	(-0.1410)
ΔCIF	1.4546	1.5871	-0.2742
	(0.2352)	(0.2063)	(-1.8838)*
Recovery (k = 10)			
ΔCI	11.894***	1.8667***	-0.0546
	(0.0001)	(0.0480)	(-0.4650)
ΔCIF	0.7119	16.629***	-0.3170
	(0.7133)	(0.0001)	(-2.1145)**

Note: The F-statistic tests the joint significance of the lagged values of the independent variables, and t-statistics test the significance of the error correction term (ECT). The asterisks indicate the following levels of significance: *10 %, **5 % and ***1 %.

the CI futures and the CI index was most significant. In general, this may be due to the foreign traders who had made their move first in the futures market because of market conditions. In response to the exchange rate uncertainty at the time, foreigners were struggling to sell their portfolio in order to minimise their anticipated losses. This action was later replicated by local investors in the cash market, causing a sharp decline within a short period of time.

Table 4 shows that foreign participants accounted for 55 % of total futures market participants in 1996 compared to local participants, who numbered only 20 %. Even more surprising was that Local Institutions represented only 1 % of total futures market participation. In 1997 and 1998, foreign participants steadily maintained their participation level at 46 % and 49 %, respectively. Local participants, especially the Retails, also maintained their level at 31 % and 33 % in 1996 and 1997, respectively. In September 1998, most of the foreigners offset their futures market positions and sold their cash market portfolio due to government capital control measures, and this resulted in a sharp decline in foreign participation in the futures market as well as in the cash market leaving only 14 % and 16 % in 1999 and 2000, respectively.

Table 5 shows that foreign participation in the futures market during the crisis increased from 38 % to 58 %. This market demography has proven the assumption that foreigners hedged their cash market position by going short in the futures market, hoping to gain a profit to cover their losses in the cash market. They were taking advantage of bearish market sentiment by locking in their profit in the futures market. By late 1998, foreign investors offset their futures market position, leaving foreign participation during recovery at 15 % only. Domestic retail and local member participation during the crisis declined by 6 % and 7 %, respectively, in adverse reaction to this foreign investment trend. Domestic retail and local investors did not take advantage of the downward trend sentiment due to lack of futures trading knowledge, an improper regulatory structure, wide publicity on losses suffered by companies engaged in futures transaction and lack of in-depth market for hedging[6].

The interesting issue here is why the initial transactions made by the foreigners were done in the futures market first. It has been suggested that the existence of transaction costs, capital requirements and the freedom of short-selling transactions may have made it optimal for some to trade in the futures market rather than in the cash market. As explained by Grossman and Fleming (1990), the futures market may provide more immediacy than the spot market. This implies that informed foreign

[6]Several authors, including Kim and Wei (1999), Park and Song (1999) and Radelet and Sachs (1998), put the blame for the Asian crisis on foreign investors. Bae *et al.* (2009) and Ghysels and Seon (2000) examined the role of derivatives securities in the Korean capital market. They found evidence supporting market destabilisation by foreign investors during the crisis. Foreign investors also became negative feedback traders of futures, and the permanent impact of their futures contracts sales increased substantially during the crisis.

traders may find that they can act faster and at a lower cost in the futures market than they can in the cash market, resulting in a lead-lag relationship between these two markets. With raising uncertainty, foreign traders were struggling to leave the market. These attributes of the futures market were the key incentives for them to exit initially via the futures market.

Another factor that could explain why the initial actions were first taken in the futures market is the liquidity factor. Grunbichler *et al.* (1994) proposed that the differences in liquidity between the two markets could also create a lead-lag relationship. As pointed out in their work, if the average time between trades for index constituent firms is longer than that of the index futures contract, information would be incorporated, on average, more rapidly in futures prices than in cash prices. Thus futures prices will adjust more quickly in reaction to economic conditions than would cash prices. This period of adjustment could also be attributed to the investor behaviour. As explained by Kim and Wei (1999), traders in the developing futures market are made up of mostly foreign institutional traders, who are generally more informed than local traders. With these advantages it is expected that they would react to information more efficiently than other less-

TABLE 4
Market Demography of Futures Market

Category	Year 1996	Year 1997	Year 1998	Year 1999	Year 2000
Foreign Institutions	52 %	45 %	47 %	14 %	16 %
Domestic Institutions	1 %	2 %	1 %	4 %	4 %
Overseas Retail	3 %	1 %	2 %	2 %	2 %
Domestic Retail	19 %	31 %	33 %	51 %	49 %
Local Members	20 %	17 %	15 %	26 %	28 %
Proprietary	5 %	4 %	2 %	3 %	1 %
Total	100 %	100 %	100 %	100 %	100 %

TABLE 5
Market Demography of Futures Market

Category	Before Crisis	During Crisis	Recovery
Foreign Institutions	38 %	58 %	15 %
Domestic Institutions	3 %	0 %	3.5 %
Overseas Retail	1 %	0 %	2 %
Domestic Retail	34 %	28 %	50 %
Local Members	19 %	2 %	28 %
Proprietary	5 %	1 %	1.5 %
Total	100 %	100 %	100 %

Before Crisis : As at June 1997
During Crisis : As at June 1998
After Crisis : Average Rate for 2000 and 2001
(Source: Malaysian Derivatives Exchange - MDEX)

informed traders.

CONCLUSION

The major objective of this paper is to ascertain the effect of derivatives trading on the Malaysian stock market. The Johansen-Juselius co-integration test indicates that there are signs of increasing integration between the Malaysian futures market and the cash market over time. The Granger causality test indicates that the stock index futures cause no reverse direction to the cash index during periods of financial crisis and recovery. The causal relationship is more vigorous in the high volume-trading period with significant volatility, particularly during a financial crisis period. It is suggested from the estimated results that the futures market played a key role during the Malaysian stock market turbulence in 1997-98. The fraction of index futures volume started to increase dramatically in July 1997. The massive selling sentiment in the futures market during the crisis was eventually transmitted to the cash market, causing a decline in cash prices, a pattern which was not observed prior to the crisis.

Given the significance of futures trading, we examine whether futures trading by foreign investors exerted a destabilising influence during the crisis. We find that foreign investors increased their presence in the futures market and dramatically increased their herding of futures trading. During the crisis period, to protect their profitability, foreign traders fled the cash market and entered the futures market. Observing this, the local investors in the cash market reacted irrationally and made similar moves without giving any form of consideration to the strong fundamentals at that time (Kremer & Nautz, 2011). On the other hand, the foreigners took advantage of the flexibility features of the futures market such as lower transaction cost, small capital requirement, ease in engaging in short selling activities, and no barriers to entering and exiting the market. Thus, the estimated results suggest that, to a certain extent, the transmission of information from the futures market to the cash market during the period of "bad economy" could have been due to manipulation by foreign participants.

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