

Introduction

The Asian financial crisis creates the question about the investor behavior. Closed-end country funds were traded at large premium for the Asian crisis countries during the Asian crisis period while non crisis country funds were traded at discount. Asymmetric information and investor sentiment make the difference in investment behavior between local and foreign investors as summarized in Frankel and Schukler (1996,1998a). The impact of different investor behavior could be seen during the Asian crisis. The large premium during Asian crisis became smaller and turned to be discount during subprime crisis. The investor behavior changed between both crisis periods.

Since the closed-end country funds (CECFs) trade the same asset in different countries, so the CECF price and net asset value (NAV) of underlying asset in local market should be the same. However, the CECF premium which is the difference between price and NAV is varied in both emerging and developed country funds. There are three possible explanations which are imperfect arbitrage, different holding investor and asymmetric information that explain why the CECF price is different from its NAV.

Our purpose is to investigate the investor behavior from the year 1994 to 2009 which includes both Asian and Subprime crisis periods by employing the Closed-end country funds (CECFs) traded in U.S. market and their net asset values (NAVs) to compare the difference in investor behavior in different crisis periods.

The objectives of this study are: (1) to document the behavior of CECF premiums during the year 1994 to 2009; to examine the change in the premium of the prices over NAVs during both crisis periods; (2) to analyze the short-run dynamic relationship between CECF prices and NAVs during the same period to compare the behavior in different crisis periods; (3) to determine the foreign investor sentiment factors and see whether the sentiments are the

same in both crisis periods: (4) to estimate the direction of the information flows in both crisis periods.

We identified 9 closed-end country funds from 7 Asian emerging market indices including four Asian crisis countries over the period of March 1994 to December 2009. The premiums are shown in figures 1 to 3. Four Asian crisis country funds were traded at premium during the Asian crisis while during the Subprime crisis; most funds were traded at discount.

In this paper, we followed Dowe and Domuta (2001) to study the short-run dynamic relationship and foreign investor sentiment to estimate the investor behavior during the Subprime crisis and compare with the Asian crisis. Moreover, we also followed the method from Cohen and Remolona (2008) to find the direction of information flow during the Subprime crisis and compare with the Asian crisis.

The remainder of the paper is organized as follows. In Section 2, we reviewed the overview of CECF literature. Section 3 discusses on the data and the correlation of Asian market return and U.S. market return. Section 4 discusses on methodology and result. Section 5 discusses on summary and conclusion.

Literature review

A CECF is a listed investment company that issues fixed number of share selling through an IPO which invests in securities of a particular country and trades in New York Stock Exchange. The value of underlying asset of the fund is known as Fund's Net Asset Value (NAV). So, fund's NAV should reflect the information and expectation of local market. Suppose that the global capital market is efficiently and perfectly integrated, the difference between CECF and NAV should be very little and will be no pricing anomalies. However, the

CECF share cannot be redeemed to the original share in the domestic country so, the perfect arbitrage will be impossible to practice. Arbitrage limitation results in pricing differentiation occurred not only in an emerging market funds but also for large and liquid CECFs as summarized in Frankel and Schmukler (1997). Eun et al. (2002) indicated that CECFs will trade at their NAVs when no face supplies restriction. Funds generate premium when they can make the closed substitute to the home country and collect the risk aversion of home country investor. Bodurtha et al. (1995) found that fund premiums are the investor sentiment and the higher foreign restriction the higher premium the funds will generate and the standard deviation of the fund prices are higher than the net asset values.

First, imperfect arbitrage claims that asset illiquidity, exchange rate risk, transaction cost and other barrier are costs to arbitrage. Pontiff (1996) stated that two main costs, transaction cost and holding cost, affect arbitrage profit. Frankel and Schmukler (1996) found that the pure arbitrage strategy cannot be easily occurring. Since the CECFs cannot redeem to the original stocks, investors cannot treat CECF shares to be the same as underlying assets. In a frictionless market, arbitrage can earn profit from discounted fund by buying CECF stock and selling the securities in the fund portfolio. The opposite strategy holds for the premium fund – selling CECF and buying the portfolio stock. However, the costs occur in holding such strategy. Errunza et al. (1998, 2000) interpreted the mispricing of the fund based on the degree of foreign markets accessibility and which country funds are substitutes for the underlying assets. They demonstrate the potential for country funds to enhance efficiency in asset pricing across segmented markets. Bosner-Neal et al. (1990) found that an announcement of a relaxation of investment restrictions is associated with a 6.8% decrease in the price/NAV ratio, during the 3 weeks after the announcement while the raising in barriers does not.

Second explanation, the underlying assets assume to hold by rational investors while CECFs are hold by both rational and irrational investors (noise traders). The trading decision

of noise traders are not based on economic fundamentals. As the noise trader unpredictable's behaviors create risk in CECF prices, thus the CECF prices can diverge significantly from their NAVs. The CECFs are riskier than the underlying assets because the funds are hold by noise traders which their behavior cannot be easily predicted. As summarize in De Long et al. (1991) that noise traders create an unpredictable risk and they can earn a higher return than rational investors by creating an unpredictable risk. Pontiff (1997) stated that if investors are rational, both closed end mutual fund returns and underlying securities should have the same variance. Lee et al. (1991) analyzed domestic investor sentiments with domestic closed-end funds where the underlying fund assets are traded in the same market as the fund shares. Hardouvelis et al., (1994) provided co-movement in the discounts across funds and excess variation of country fund prices relative to NAV returns. They argue in favor of a noise trader model of asset pricing.

Third explanation, asymmetric information can be assumed in different ways. First, local investors can access to local information while foreign investors cannot. Second, both local and foreign investors can access same information, but they interpret in different ways. Third, local investors can access to the information faster than foreign investors. Fourth, CECF holders may lack of information about the funds themselves. It seems that the fund investors are inferior to the domestic investors, but the global diversification is attractive to the investors. Some investors who have limited information about the local markets and funds may be more attracted to buy CECFs at the cost that is lower than buying underlying assets. Also, the fund managers are generally more informed and can diversify fund better. Frankel and Schmukler (1996) studied on the Mexican crisis, and they found that the local investors have more information than country fund investors. Klibanoff et al., (1998) tested on whether news on domestic affects the price of closed end fund to asset value. The result shows that investors react more quickly to the news.

Chandar and Patro (2000) found that premium increase during currency crisis results from the CECF prices under react to NAV. Since NAVs are driven by local market while CECF prices are sensitive to global market, so the more dramatic decline in NAVs relative to the CECF prices results in an increase in premium or a decrease in discount. Bowe and Domuta (2001) investigated the behavior during 1997 Asian crisis. They found that both types of investor expectations are important to pricing behavior for both local and U.S. markets and foreign investors have significant impact in the Asian crisis. Klibanoff et al., (1998) found that CECF prices are under react to information on local fundamentals value of Asian assets.

Data

The CECF data consists of closing price, in U.S. dollars, for the Asia emerging market obtained from Datastream. The nine country funds with their NYSE codes are: China fund (CHN), India fund (IFN), Indonesia fund (IF), Korea equity fund (KEF), Korea fund (KF), Malaysia fund (MAY), Taiwan fund (TWN), Thai fund (TTF), Thai capital Fund (TF). Six funds are from four Asian crisis countries: Indonesia, Korea, Malaysia, and Thailand. Daily closing value of seven local stock market indices obtained from Datastream. Closing values of S&P 500 are also obtained from Datastream. Fund NAVs for both weekly and daily date, funds start to have a daily data announcement after October 1996, are obtained from Bloomberg. The data used during March 1994 to December 2009.

Table I to IV show the pairwise Pearson correlation matrix between Asian market returns and US market return between March 1994 and December 2009. Table I shows the correlation matrix of market return from March 1994 to June 1997. It shows that China has correlation only with Korea in this period. Taiwan has correlation with only one market which is Malaysia. India shows the significant with four markets Indonesia, Korea and Malaysia and Thailand with the coefficient ranging from 0.07 to 0.13. Indonesia, Malaysia and Thailand are highest correlated in this period with each other with the coefficient ranging from 0.33 to

0.41. Korea has correlation with China, India and U.S. market. The U.S. market return has a significant correlation with Indonesia, Korea and Malaysia.

Table II shows the correlation matrix during the Asian crisis period from July 1997 to October 1998. Four Asian crisis countries are highly correlated with the coefficient ranging from 0.27 to 0.54. Taiwan also shows the significant result with Four Asian crisis country but lower coefficient compare with the crisis countries. India has correlation with Malaysia and Thailand while China still has no correlation with Asian countries. U.S. market return shows the significant result with all Asian countries with the negative correlation of -0.12 with China and positive correlation with other Asian markets ranging from 0.14 to 0.19.

Table III shows the correlation during after the Asian crisis period from November 1998 to January 2007. All Asian markets except China are correlated with others but the coefficients are lower than the Asian crisis countries during the Asian crisis period. China has correlation with India, Taiwan, Indonesia and Thailand with the coefficient of 0.06 to 0.08. U.S. market has the correlation with Asian market except China.

Table IV shows the correlation matrix between Asian market returns and U.S. market return during the Subprime crisis from February 2007 to December 2009. All Asian markets and U.S. market are highly correlated with each other with the coefficient of 0.25 to 0.74 while U.S. market and China still insignificant. Asian markets excluded China show the highest correlation in all period which the coefficient of 0.49 to 0.74.

Methodology

The behavior of premium

We begin with the graphs show the behavior of the premiums from March 1994 to December 2009 and descriptive statistic of the fund premiums. As shown in figures 1 to 3, the funds were generally traded at small discount and premium at the beginning of the sample period. They began to rise to the large premiums for the Asian crisis countries while the non crisis countries (China, India and Taiwan) were traded at discount during the Asian crisis period. After the Asian crisis, about 80% of the funds started to trade at discount except for china and India that seemed to have some large premium during 2003-2006 while all funds were traded at small discount during the Subprime crisis.

Table V presents the descriptive statistic for the fund premiums for the full sample and four sub-sample periods to show the difference in each period. The average premiums of the full sample period range from -15.05% to 3.93%. During the Asian crisis, the premiums ranged from -23.31% to 50.19% which all Asian crisis countries were traded at premium and non crisis countries were traded at discount. The premiums behaved in different ways during the Subprime crisis, they all showed the average discount which were ranging from -3.99% to -12.52%.

The *t*-statistic of the table V shows the significant change in premiums by using dummy variable of one for crisis period and zero for non crisis period and adjusted for autocorrelation in residual by using Newey-West lags as suggested in Chandra and Patro (2000). The *t*-statistic for the Asian crisis period uses one during the Asian crisis period and zero for the period from March 1994 to June 1997. The Asian crisis country fund premiums are significantly positive except for Korea fund (KF) while China, India and Taiwan which are less affected by the Asian crisis are traded at discount. The *t*-statistic for the Subprime

crisis period in second column in table V (Cont.) uses one during Subprime crisis period and zero from November 1998 to January 2007. The results show that all funds are traded at discount and only four funds are significant different from the non crisis period while other five funds are insignificant. The last t -statistic test in the last column shows the comparison between Asian crisis and Subprime crisis using the dummy variable of one for Subprime crisis and zero for Asian crisis. All fund premiums are significantly different in both crises as shown in the table that all fund premiums during the Subprime crisis are significant different from the Asian crisis.

Testing for exogeneity

To analyze the dynamic relationship, we use the short-run dynamic relationship between CECFs and the Asian market returns. In the short run dynamic relationship, we followed Bowe and Domuta (2001) by testing for exogeneity for short run and long run by using error correction model (ECM). Exogeneity test is to test whether short run lagged change in CECF prices can explain the change in local asset values and vice versa and also which variables adjust to other variables in the long run. Theoretically, both CECFs and underlying assets are the same asset traded in different market, there should be cointegrated between CECFs and underlying assets in a frictionless trading environment.

In this part, we try to determine whether the CECF prices or local stock markets tend to be exogenous. we study whether lagged short-run change in CECF prices and local asset values can significantly explain the current change in each variables and which variable tend to adjust to the other in the long-run relationship. We expect that the variable that incorporate more information about the asset fundamental values will tend to be exogenous with respect to other variable. If local stock market indices are closer to change in the underlying fundamental value than the CECF prices, then the CECF prices change will be predicted by present underlying asset prices change. In contrast, if CECF prices are closer to change in the

fundamental, the local stock market indices change will be predicted by present CECF prices change.

The procedures require stationary variable to test. We use augmented Dickey-Fuller (ADF) to test unit root and the results are the same as in Bowe and Domuta (2001) that all fund price and market index variables are fail to reject non-stationary and fund return and market return variables are rejected non-stationary.

CECF prices and local stock market indices (as a proxy for fund underlying assets) are two different values of the same asset, so long-run relationship between both variables would exist. The linear (stationary) long-run relationship between CECF prices and local markets will be $F_t = \pi + \lambda L_t + \varepsilon_t$, where F_t is CECF closing price at time t , L_t is Asian market index closing price at time t , the mean-zero error term ε is stationary, ε_t is $I(0)$. The cointegration test is based on the trace and eigenvalue likelihood ratio developed by Johansen (1988) and Johansen and Juselius (1990).

The error correction model (ECM) between CECFs and the Asian markets. One advantage of ECM is both short-run and long-run dynamic are obtained in ECM. The specification relates the CECFs and Asian markets to the one-period lagged cointegrating vector, and to lagged first differences of both dependent variables.

$$\begin{aligned} FR_t &= \omega_1 + \alpha_1(F_{t-1} - \pi - \lambda L_{t-1}) + \sum_{j=1}^L \beta_{1j} FR_{t-j} + \sum_{j=1}^L \gamma_{1j} LR_{t-j} + u_{1t} \\ LR_t &= \omega_2 + \alpha_2(F_{t-1} - \pi - \lambda L_{t-1}) + \sum_{j=1}^L \beta_{2j} LR_{t-j} + \sum_{j=1}^L \gamma_{2j} FR_{t-j} + u_{2t} \end{aligned} \quad (1)$$

Where LR_t is Local Asian asset market dollar return ($\ln L_t - \ln L_{t-1}$) from closing time t-1 to t

LR_{t-1} is Local Asian asset market dollar return ($\ln L_{t-1} - \ln L_{t-2}$) from closing time t-2 to t-1

FR_t is CECF return ($\ln F_t - \ln F_{t-1}$) in New York from closing time t-1 to t

FR_{t-1} is CECF return ($\ln F_{t-1} - \ln F_{t-2}$) in New York from closing time t-2 to t-1

Lag length is selected by using Akaike Information Criterion (AIC). Weak exogeneity test can conduct by analyzing the parameters α_1 and α_2 as the long-run relationship adjustment. A significant fitted α_1 (α_2) means that CECF prices (local market indices) have the long-run adjustment to the change in cointegrated relationship. The results from table VI show that only 5 out of 9 funds have significant α_1 during the Asian crisis period which two funds, Korea equity fund (KEF) and Thai fund (TTF), are invested in the Asian crisis countries and three funds, China, India and Taiwan, are invested in the non Asian crisis countries. The α_2 is significant for 5 out of 9 funds but the coefficients are relatively small except India that the coefficient is high. During the Subprime crisis period, the α_1 is significant for most of the funds except Indonesia fund and Korea equity fund (KEF) while α_2 is significant only for Korea Equity fund (KEF). The results during the Subprime crisis show a clear picture that the local asset values better reflect the fundamental information as reported in Frankel and Schmukler (1998a). It also corroborates with the noise trader studies which assume that CECFs are hold by noise traders while the fund's underlying assets are hold by rational investors. The CECF prices will adjust to the fundamental value if CECF investors are under or overpredict the CECF prices.

Short-run adjustment analysis provides the evidence of interaction between CECF returns and the local stock market returns. This test looks at whether the γ_{1j} and γ_{2j} are jointly zero. If the vector γ_{1j} (γ_{2j}) is significant difference from zero, it implies that CECF prices (NAVs) adjust to past change in NAVs (CECF prices). During the Asian crisis, γ_{1j} is significant for India, Malaysia and Thailand (TF) and γ_{2j} is significant for only five funds. While both γ_{1j} and γ_{2j} are significant for all funds during the Subprime crisis period.

Foreign investor sentiment undifferentiated or country-specific.

Testing the foreign sentiments by using the trivariate VAR which it can explain the direct and indirect relationship between both CECF and US returns on Asian markets. An advantage of trivariate VAR is that it can test a weak form and strong form sentiment and define the direct and indirect impact of CECFs and US stock market on local markets.

Objective of this section is to test the nature of the foreign investor sentiment factor by using trivariate VAR in 3 variables; Asian stock market returns, CECF returns, and S&P 500 return over 4 sub-periods. To test whether CECF returns influence Asian stock market returns when controlling for the S&P 500 index return as the U.S market sentiment. From Eq. (2) we term a strong and weak forms and use them to define the direct and indirect causal impact of CECFs and US market returns on local market returns as define in Bowe and Domuta (2001).

$$\begin{aligned} FR_t &= \varpi_{10} + A_{11}(L)FR_{t-1} + A_{12}(L)LR_{t-1} + A_{13}(L)USR_{t-1} + \varepsilon_{1t} \\ LR_t &= \varpi_{20} + A_{21}(L)FR_{t-1} + A_{22}(L)LR_{t-1} + A_{23}(L)USR_{t-1} + \varepsilon_{2t} \end{aligned} \quad (2)$$

Where USR_{t-1} is an S&P 500 return ($\ln USR_{t-1} - \ln USR_{t-2}$) from closing time t-2 to t-1

ϖ_{i0} terms are parameters representing the intercept term

A_{ij} s are the polynomial in the lag operator L (which is defined as $L^j Z_{t-1} = Z_{t-1-j}$ for

$Z=FR, LR, USR$).

- strong composite foreign sentiment (direct causality from both CECF and US returns): $A_{21}(L) \neq 0$ and $A_{23}(L) \neq 0$;
- strong country-specific foreign sentiment (direct causality from CECF; no direct or indirect causality from US returns) : $A_{21}(L) \neq 0, A_{23}(L) = 0, \text{ and } A_{13}(L) = 0$;

- weak country-specific foreign sentiment (direct causality from CECF; indirect causality from US returns): $A_{21}(L) \neq 0$, $A_{23}(L) = 0$, and $A_{13}(L) \neq 0$;
- undifferentiated foreign investor sentiment (direct causality from US returns; no direct): $A_{21}(L) = 0$, $A_{23}(L) \neq 0$

The results of trivariate VAR are shown in Table VII. China, Taiwan and Korea (KF) have zero lag on the before the Asian crisis period. Indonesia and Thailand show the strong composite foreign sentiment before the Asian crisis period. India shows strong country-specific foreign sentiment. Korea (KEF) shows weak country-specific foreign sentiment and Malaysia shows undifferentiated foreign investor sentiment. Investor sentiment seem to be different during the Asian crisis period, China still has zero lag while India, Malaysia and Thailand (TF) have zero lag in this period. Taiwan shows the strong composite foreign sentiment. Indonesia and Korea show strong country-specific foreign sentiment. Lastly Thailand (TF) shows weak country-specific foreign sentiment.

After the Asian crisis, China still has zero lag while other funds have strong composite foreign sentiment. During the Subprime crisis, 6 out of 9 funds have undifferentiated foreign investor sentiment. While Taiwan has strong composite foreign sentiment and Korea has weak undifferentiated foreign investor sentiment.

The direction of the information flows

To test on the information flow, we compare the daily return between CECFs and the Asian markets. This tells about the day to day information flow between different groups of investors. Since there is no overlapping in trading hour between U.S. market and Asian markets, so we can assume that the information in Asian market trading hours will incorporate with the U.S. Closed-end country funds in the same day. Additionally, the U.S. funds information will pass to Asian markets in the next day. To see lead and lag term of

price movement of one market to the other, testing both impact of Asian returns on CECFs and impact of U.S. sentiment on local returns by employing the OLS method using in Cohen and Remolona (2008).

The relative level of sentiment of Asian and U.S. investors can be indicated by comparing the CECF prices and NAVs. Even though, most of the funds change their NAVs announcement from weekly to daily basis after 1996¹ except for India fund and Thailand capital fund that still have weekly NAVs announcement. The weekly NAVs announcement obtains little information for CECF investors and it cannot tell the way that U.S. and local markets reveal the information. In this section, we attempt to test the direction of information flows between U.S. and Asian markets by comparing daily CECF returns to daily local market returns as both markets are open at different time.

The timing difference between two markets can pass the information from one market to the others. An identical security, CECF, traded in different markets can be informative about the news relevant to fundamental, or about the change in sentiment or riskiness of expected returns. If CECF returns lead local market returns, it would be evidence for the importance of U.S. investor sentiment in determining local market returns. On the other hand, if the local markets return lead CECF returns would be less conclusive. Those indicate an importance of local sentiment, both the local and fund returns could react to local news.

Impact of Asian local returns on US country funds: Using the close-to-close price movements of the local market returns and the CECF returns using a simple OLS method. The fund returns are related to that day's U.S. dollars returns on the corresponding local market indices, the average U.S. dollar returns on local market indices for the other six countries in the region, and the return on the Standard and Poor's 500 stock index

¹ Korea fund (KF) started daily NAVs announcement from October 2006 followed by Indonesia fund (IF) from February 1999. In 2006, most fund announce its NAVs on daily basis except India fund(INF) and Thailand capital fund(TF).

$$\begin{aligned}
FR_t^i = & b_0 + b_1 D_t^{97} + b_2 D_t^{a97} + b_3 D_t^{07} + B_4 LR_t^i + B_5 D_t^{97} LR_t^i + B_6 D_t^{a97} LR_t^i \\
& + B_7 D_t^{07} LR_t^i + B_8 USR_t + B_9 D_t^{97} USR_t + B_{10} D_t^{a97} USR_t + B_{11} D_t^{07} USR_t \\
& + B_{12} RR_t^i + B_{13} D_t^{97} RR_t^i + B_{14} D_t^{a97} RR_t^i + B_{15} D_t^{07} RR_t^i + B_{16} FR_{t-1} + \varepsilon_t
\end{aligned} \quad (3)$$

Where i is indexes funds and countries.

RR_t^i is a regional return index formed as an equally weighted average of the daily returns on the local indices excluding that of country i . In other words,

$$RR_t^i = \left(\frac{1}{6} \right) \sum_{j \neq i} LR_t^j \quad (4)$$

D_t^{97} : Dummy variables taking the value one from July 1997 and October 1998

D_t^{a97} : Dummy variables taking the value one from November 1998 to January 2007

D_t^{07} : Dummy variables taking the value one from February 2007 to December 2009

The regional return factor (RR_t) allows for the possibility of contagion effects that U.S. investors might take information from a regional return into account when pricing the CECFs, even if the regional return has not yet been fully incorporated into the local market as stated in Cohen and Remolona (2008).

Portfolio of funds is an equally weighted of funds in particular countries. The left hand side variable is an average of the particular fund, independent variable (LR_t^i) is the average of seven country index returns, RR_t^i are dropped. The purpose of estimating of portfolio is to summarize overall effect in the region and also provide the investor valuation decision on the region. If the foreign investors are based on regional rather than individual country, then the impact on local return will be appear on a daily return of the portfolio of the funds and indices. On the other hand, if the foreign investors are focus on individual country, the portfolio will produce a weak result.

The first panel of table VIII shows the result of equation (3) using OLS estimation for seven fund returns and portfolio returns. The second panel shows the total effect during the Asian crisis on each equation for local market, regional and U.S. market return variables ($B_4 + B_5, B_8 + B_9, B_{12} + B_{13}$). The third panel shows the total effect ($B_4 + B_6$) during non-crisis period after the Asian crisis and before the Subprime crisis. The fourth panel shows the total effect ($B_4 + B_7$) during the Subprime crisis.

During all four periods, both local and U.S. daily market returns are positive and significant at 5% significant level for portfolio and each fund return. It shows the similar result with Cohen and Remolona (2008). The adjusted R^2 indicates that the model explains between 15 % (Thailand TF) and 55 % (Korea) of the fund returns, and 61% of the portfolio returns.

The portfolio of the funds in the first column can clearly explain change in the nature of the fund returns. Before the Asian crisis, the coefficient of local and U.S. market returns are 0.58 and 0.61, respectively which means that both variables have similar impact on the fund returns. During the Asian crisis, U.S. market return shows the higher result of 0.92 while portfolio return is 0.61. After the Asian crisis but before the Subprime crisis, the coefficients show the result that the portfolio return shifts sharply to 0.92 while the U.S. return decreases to 0.57. During the Subprime crisis, the result is similar to the Asian crisis period that the coefficient of U.S. return is higher than portfolio return; the coefficients are 0.90 and 0.59, respectively. The results are similar to Cohen and Remolona (2008) and they suggested that the U.S. investors become more closely tied to the U.S. market during the Asian crisis. The result is the same during the subprime crisis period that the foreign investors tied to the U.S. market more than local markets.

Before the Asian crisis period, most funds show the similar result that the coefficient of local market return is higher than U.S. market return ranging from 0.60 to 0.84 for local returns and 0.26 to 0.59 for U.S. return except for Thailand that the U.S. return (average of 0.75) is higher than local return (0.51 on average) while the local return is insignificant for China. The regional return is also significant for most funds but with low coefficient ranging from 0.02 to 0.10 while Taiwan, Korea and Thailand are insignificant.

During the Asian crisis, U.S. return become more important factor to the Asian crisis country funds while India and Taiwan show similar result as before the Asian crisis period but U.S. return shows higher coefficient for China. The U.S. return coefficients are ranging from 0.51 to 1.14 while the local return coefficients are ranging from 0.29 to 0.83. The regional return shows the significant result in China, India, Indonesia, Korea (KF), and Malaysia.

After October 1998, the proportion of U.S. and local returns become similar to before the Asian crisis period which is the local return is higher than U.S. return for most funds except Thailand (TTF) that the U.S. return is higher but it shows the similar result with before the Asian crisis period. The regional return has an impact for all funds with low coefficient ranging from 0.02 to 0.11.

During the Subprime crisis, the impact of U.S. return rises up again and the result is very similar to the Asian crisis period that the U.S. return become more important factor in determining the fund returns except for Taiwan, Malaysia, and Thailand(TF) that the proportion are nearly the same. The coefficient of U.S. return is ranging from 0.76 to 1.30 which seems to be higher than Asian crisis period and local return is ranging from 0.20 to 0.60. The regional return becomes insignificant to most funds except for China, Taiwan, Malaysia and Thailand (TF).

Impact of U.S. sentiment on Asian local returns: to study information flowed from U.S. markets to Asian markets, using the CECF prices as a proxy for information (including changes in sentiment) relevant to local markets that become known during U.S. trading hours.

$$\begin{aligned}
LR_t = & b_0 + b_1 D_{t-1}^{97} + b_2 D_{t-1}^{a97} + b_3 D_{t-1}^{07} + B_4 FR_{t-1}^i + B_5 D_{t-1}^{97} FR_{t-1}^i + B_6 D_{t-1}^{a97} FR_{t-1}^i \\
& + B_7 D_{t-1}^{07} FR_{t-1}^i + B_8 USR_{t-1} + B_9 D_{t-1}^{97} USR_{t-1} + B_{10} D_{t-1}^{a97} USR_{t-1} \\
& + B_{11} D_{t-1}^{07} USR_{t-1} + B_{12} FRO_{t-1}^i + B_{13} D_{t-1}^{97} FRO_{t-1}^i + B_{14} D_{t-1}^{a97} FRO_{t-1}^i \\
& + B_{15} D_{t-1}^{07} FRO_{t-1}^i + B_{16} LR_{t-1} + \varepsilon_t
\end{aligned} \tag{5}$$

FRO_{t-1}^i defined as the equally weighted average of the six daily country-fund returns excluding that corresponding to country i .

$$FRO_t^i = \left(\frac{1}{6} \right) \sum_{j \neq i} FR_t^j \tag{6}$$

The table IX shows the result of equation (5) using OLS estimation for seven index returns and portfolio returns. The first column shows the portfolio of returns calculated by weighted average of seven index returns in the region as a dependent variable. The left hand side variable is an average of the particular fund, independent variable (FR_{t-1}) is the average of seven country fund returns, FRO_{t-1}^i are dropped. The remaining seven columns show the coefficients for the seven local market returns. The second panel shows the total effect during the Asian crisis on each equation. The third panel shows the total effect during after the Asian crisis and before the Subprime crisis. The forth panel shows the total effect during the Subprime crisis.

The adjust R^2 shows low value in each equation ranging from 0.00 to 0.08. The US market and fund returns do not have a significant explanation in most funds before and during the Asian crisis periods. The fund return is significant only for India, Korea and Thailand ranging from 0.09 to 0.16 and the U.S. return is significant only for Malaysia with the coefficient of 0.19 before the Asian crisis period. During the Asian crisis period, fund return is significant only for Taiwan (0.16), Indonesia (0.23) and Korea (0.60) while U.S. return is

significant only for India, Taiwan and Indonesia. The non-country fund return (FRO) has no impact in all funds before the Asian crisis while it is significant for Indonesia, Malaysia and Thailand during the Asian crisis.

After the Asian crisis, US market return has an effect to all countries except China while fund return is significant only for India, Korea and Thailand and non-country fund return (FRO) has impact only Taiwan. The fund return has impact on India, Korea and Thailand after the Asian crisis while it is significant only for Taiwan and Thailand during the Subprime crisis. Meaning that the US market starts to have an influence on the local market after the Asian crisis and continue to have more effect during the Subprime crisis period and the US market still has no effect on China Market. While the FRO has small effect on the local markets after the Asian and Subprime crises.

Summary and conclusion

This study compares the investor behavior between two crisis periods by looking at the relationship between CECF prices and the underlying assets for group of seven Asian countries during March 1994 to December 2009. The main objective is to investigate the change in behavior in different crisis period.

First, we investigated the premiums of the closed end country funds during both the Asian crisis and the Subprime crisis using four Asian crisis countries and three less affected countries during the Asian crisis. Our result indicates that the Asian crisis country funds were traded at large premium during Asian crisis while the China, India and Taiwan which were less affected during the Asian crisis were traded at discount. One possible explanation obtained from Chandra and Patro (2000) is that the affected fund prices were underreact to NAVs change. However, the premium during the Asian crisis turned to a discount during the

Subprime Crisis and the result shows that the discounts during the Subprime crisis were not much different from the non crisis period before the Subprime crisis.

There is no strong evidence that both U.S. market and fund returns are significantly explain local market differently for both Asian crisis countries and non Asian crisis countries during the Asian crisis period. However, both factors show strong evidence in explaining the local markets after the Asian crisis and only U.S. market shows strong evidence during the Subprime crisis.

The closed end country funds seem to be less responsive to the local market returns in both Asian and subprime crises while the funds were more responsive to the U.S. market return in both crises. During the Asian crisis, the fund returns had more influence on the local markets than before the Asian crisis period while it was lower after the Asian crisis period and no impact on local markets during the Subprime crisis. On the other hand, the U.S. market seemed to have little impact on local market before October 1998 while it started to have significant impact to the local markets after the Asian crisis and more impact during the Subprime crisis.