

# **INVESTOR SENTIMENT AND FINANCIAL CRISES: EVIDENCE FROM CLOSED-END COUNTRY FUNDS**

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## **Abstract**

Following Frankel and Schmuckler (1996, 1997), closed-end country funds are analysed as a mechanism for distinguishing between the role of local and foreign investors in a country's financial markets. Foreign investor sentiment has been identified as an important factor in explaining why closed-end country funds customarily trade at a discount to their net asset value, although this discount is often observed to turn into a large premium during financial crisis. This paper uses stock market and exchange rate data for South East Asia and South American countries in order to identify the respective roles of foreign and domestic investor sentiment in propagating those regions recent financial crisis.

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## I. Introduction

The financial crises in Latin America, Asia and Central Europe raise a variety of questions relating to the dynamics of the information transmission process in international capital markets. A series of recent studies, summarised in Frankel and Schmuckler (1996, 1997),<sup>1</sup> argue that differing investor sentiment and/or the existence of asymmetric information in financial markets induces divergent expectations reflected in differing trading behaviour among the local and foreign investor communities. The impact of this investor heterogeneity may be particularly evident during times of market turbulence, such as that experienced during a financial crisis. One hypothesis, expressed at various times by the International Monetary Fund (IMF)<sup>2</sup> is that local investors tend to be the initiators of any crisis. This possibility reflects these investors proximity to relevant economic and/or policy related information, enabling them to be the first to react to any deterioration in local economic conditions. Other commentators, notably the Prime Minister of Malaysia in a well-documented comment, place the responsibility for crises firmly at the feet of the international investor community, in particular foreign speculative investors.<sup>3</sup> This paper addresses this particular issue. Specifically, we ask: is it possible to identify the extent to which the propagation of financial crises is attributable to the reactions of resident (domestic) investors to the economic conditions in the (relevant) emerging market, as opposed to the views of that market's economic prospects held by foreign investors?

As a framework for distinguishing between the influence of local and foreign investor activity in a country's capital markets, we adopt an approach which analyses the pricing behaviour of closed-end country funds (CECFs). CECFs are a recently innovated vehicle for global investment, the majority of funds being established during the late 1980s and early

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<sup>1</sup> J. Frankel and S. Schmuckler, (1996) "Country Fund Discounts and the Mexican crisis of 1994: Did Local Residents turn Pesimistic before International Investors," *Federal Reserve Board of Governors, Discussion Paper 563*, *ibid.* (1997) "Country Funds and Asymmetric Information," mimeo, Univ. of California, Berkeley, May 1997.

<sup>2</sup> See the Annual Capital Markets report (1995 p.7) in relation to the 1994 Mexico Crises, and Stanley Fischer's January 1998 address "The Asian Crises: A view from the IMF", to the Bankers' Association for Foreign Trade, in Washington, D.C, expressing similar sentiments regarding Asia.

<sup>3</sup> Mathahir, M., "Highwaymen of the Global Economy," *Wall Street Journal*, 23<sup>rd</sup> September 1997.

1990s. A CECF is a publicly listed investment company which collects money from investors through an initial public offering of a fixed number of shares, and invests the proceeds in a portfolio of securities of a particular country. Shares in a CECF trade on the market on which they are listed (generally the NYSE or LSE) at a fund price which is determined by trading order flow in that market. The aggregate value of the assets (securities) underlying the fund is known as the funds Net Asset Value (NAV). These assets are individually traded in the domestic securities market of the relevant country.

While no definitive public information exists relating to the nationality of CECF holders, extensive surveys of CECF managers and administrators suggest these funds are predominantly held by investors resident in the country where the fund trades. By way of contrast a fund's NAV reflect the views of investors in the relevant domestic markets. This feature of CECFs has led Frankel and Schmuckler (1996, 1997) among others to propose that in relative terms, CECF prices provide a better indication of the information and expectations of foreign investors, while NAVs reflect the information and expectations of the domestic investor community.

## **II. Closed-end Country Funds: Some stylized facts**

Clearly, if international capital markets were efficiently and perfectly integrated, then this distinction would have little analytical significance: arbitrage would ensure that the price of the fund would always be equal to its NAV, as CECF prices and NAVs are simply two market values of the same assets. However, limits to arbitrage have resulted in the pricing behaviour of CECFs being characterised by a series of anomalies, a set of counterintuitive features specific to these instruments, which run counter to the propositions of efficient markets theory. The best documented of these puzzles relates to the consistent observation that funds customarily trade at a discount to their NAV.<sup>4,5</sup> These average discounts are large

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<sup>4</sup> The difference between the price of a CECF and its NAV forms its premium (discount) if positive (negative).

<sup>5</sup> Other commonly observed puzzles relate to: (i) the at issue trading premium of closed-end funds which later transforms itself into a discount, (ii) the wide fluctuations of fund discounts, which appear to be mean reverting, and (iii) the fact that the discounts decrease significantly around the fund termination date.

and variable. This observation holds not only for emerging market country funds, but also for large, liquid CECFs holding securities which trade in liquid stock markets in countries which do not have restrictions on capital flows.

Three classes of explanation are proposed to explain the imperfect arbitrage at the source of this phenomena. The first class explains the market frictions which prevent arbitrage in terms of the presence of transaction costs, the illiquidity of assets, exchange rate risks arising from buying and selling assets denominated in different currencies, a lack of information of CECF composition, capital gains tax liabilities and other barriers to capital mobility.<sup>6</sup> The second claims that the underlying securities and the CECF shares are held by different types of investor clientele. The generic hypothesis is that the underlying fund assets are held by rationale traders, while CEFs are held by both rationale investors and noise traders. The trading decisions of noise traders are said to incorporate sentiments, defined as generalised optimism or pessimism not based on economic fundamentals. These sentiments are reflected in a systematic risk factor resulting from the divergent expectations of rational investors and noise-traders. The latter's expectations can be modelled as containing a non-predictable (stochastic) component, as they randomly under- or overestimate the returns on CEF investment. It follows that investing in the CECF is somehow riskier than investing in the underlying assets, as the investor sentiments associated with the noise traders cannot be predicted with any degree of confidence. Since investors are risk averse, the CECF price is

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<sup>6</sup> See Pontiff, "Costly Arbitrage: Evidence From Closed-End Funds", *Quarterly Journal of Economics*, 1996, which develops a general arbitrage cost approach applying to all classes of closed-end funds. Errunza, Senbet and Hogan, "The Pricing of Country Funds From Emerging Markets: Theory and Evidence" in the *International Journal of Theoretical and Applied Finance*, 1998 propose a theoretical model for interpreting fund mispricing. The model is based on both the degree of accessibility of the foreign markets (cross-border arbitrage) and the extent to which country funds are substitutes for their underlying assets. They demonstrate the potential for country funds to enhance efficiency in asset pricing across segmented markets. Bonser-Neal et al. "International Investment Restrictions and Closed-end Country Fund Prices," *Journal of Finance*, 1990 utilise event study methodology to investigate the impact of barriers to international investment on a sample of CECF prices. They found that an announcement of a relaxation of investment restrictions is associated with a 6.8% decrease in the price-net asset value ratio across funds, during the three weeks surrounding the announcement date. They conclude that investment barriers raised by government are effective in segmenting international capital markets.

below the funds NAV.<sup>7</sup> A third explanation introduces asymmetric information into the analysis of country funds.<sup>8</sup> Domestic investors who trade in the underlying assets are assumed to be better informed than CECF investors. This informational advantage can derive from a variety of sources, such as: the ability to access relevant locally available information, lower costs of accessing such information, or the timeliness of access to relevant information. CECF investors realising their relative informational disadvantage, expect to realise a lower return on the fund than domestic investors in the fund's underlying assets, implying they are unwilling to pay as much for the same assets as domestic investors. Average positive discounts are the result. This explanation of fund discounts differs from that attributable to sentiment or noise trading, because in this asymmetric information model, CECF investors are rational individuals who generate unbiased forecasts of fund returns. Their informational disadvantage leads them to exhibit a higher subjective variance than investors in the underlying assets, hence they perceive investment in the CECF as a riskier undertaking.

This study builds upon the insight of Frankel and Schmuckler (1996) that the behaviour of CECF prices in relation to their underlying asset values can be used to isolate the relative impact of local and foreign investor sentiment in financial markets at the time of financial crisis. The paper makes several contributions. Frankel and Schmuckler analyse only the Mexican crisis in 1994. We examine CECFs for 15 countries in the 1993-1999 period, not

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<sup>7</sup> The investor sentiment approach is based on ideas originally developed by Zweig in "An Investor Expectations Stock Price Predictive Model Using Closed-end Fund Premiums," *Journal of Finance*, 1973 and DeLong, A. et al., "Noise Trader Risk in Financial Markets," *Journal of Political Economy*, 1990. Lee, Shleifer and Thaler "Investor Sentiment and the Closed-End Fund Puzzle," *Journal of Finance*, 1991 apply the investor sentiment argument to an analysis of domestic closed-end funds, where the underlying fund assets are traded in the same market as the fund shares. Thaler et al's analysis is extended to country funds by Bodhurta, Kim and Lee, in "Closed-end Country Funds and U.S. Market Sentiment," *Review of Financial Studies*, 1995. Related analysis is presented in "What Moves the Discount on Country Equity Funds?," by Hardouvelis, La Porta, and Wizman, in J. Frankel, ed., The Internationalization of Equity Markets, the University of Chicago Press, Chicago, 1994. This paper provides a useful synthesis of the main empirical regularities displayed by closed-end funds such as co-movement in the discounts across funds, stationarity of the premiums, and excess variation of country fund prices relative to net asset value returns. The authors argue in favour of a noise trader model of asset pricing. We note that major critique of the investor sentiment hypothesis has recently been articulated by Elton, Gruber and Busse in "Do Investors Care about Sentiment?" *Journal of Business*, 1998. They maintain that the sentiment (discount) index does not enter the return generating process and, therefore, is not a systematic, priced-in-equilibrium risk factor.

<sup>8</sup> First proposed by Frankel and Schmuckler (1996, 1997), op cit.

all of which exhibited financial crises. This enables us to generate a control group by which we can not only compare investor sentiment across crisis and non-crisis countries, but also ensure that our results are reflecting crisis conditions. We also use funds pertaining to markets in Latin America, and South East Asia which allows us to perform comparative analysis across regions. Following Bennett, Eom and Remolona (1998),<sup>9</sup> we also utilise a high frequency dataset, in the form of daily data on CECF prices, and US dollar values of local and US stock market indices. This strategy has both costs and benefits. Frankel and Schmuckler (1996) are not only interested in identifying whether local or foreign investors were at the forefront of the 1994 Mexican crisis, but also in explaining the dynamics of the discounts between CECF prices and their NAVs. They are thereby constrained to use weekly data on CECF values and NAVs, as the latter are only reported on Fridays. During periods of high volatility in security prices, often characteristic of crisis periods, the use of weekly data may lead to a significant loss of information which is somewhat mitigated using daily data. However, using local indices rather than the funds NAVs makes it more difficult to justify imposing a priori restrictions on any postulated long-run relationships between CECF prices and the local index.

Our objective in this paper is not to analyse or rationalise such discounts. Instead, the primary focus of this study is an analysis of the short run interaction between variables, in particular testing the role of local versus foreign investor sentiment in driving CECF prices and domestic stock market values during the crisis period. The econometric methodology, discussed in a later section, utilises a variety of approaches to identify these short-run relationships between variables, thereby ensuring the results are robust to alternative specifications.

The remainder of the paper is easily summarised. First we investigate the attributes of our variables in terms of stationarity and transform the data to ensure that its properties respond to standard econometric requirements. Second, we utilise an unrestrictive VAR and

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<sup>9</sup> Bennett et al., (1998) "The 1997 Asian Crisis: Who Lost Heart? Evidence from Closed-end Funds," *Federal Reserve Bank of New York*, mimeo, September 1998.

perform tests of exogeneity and Granger non-causality. We use both the complete sample period as well as sample sub-sets in order to capture potential differences in investor behaviour in crisis relative to non-crisis periods. The results indicate that in all periods foreign investors' expectations, as measured by recent past returns on CECFs, is relevant in predicting current emerging stock market returns. This significance remains once we control for US market sentiment. Moreover, while generally during crisis periods this relationship is reciprocal, in non-crisis periods local markets do not always incorporate information which is relevant for explaining CECF returns. This suggests that CECF trading on U.S market can be to a certain extent self-determining. We conclude by comparing our results to those of Frankel and Schmukler (1996) and Bennet et al., (1998).

### **III. Testing for Exogeneity: Local versus Foreign Investors**

This section analyses by means of exogeneity tests whether lagged short run changes in CECF prices and the relevant emerging market indices are significant in predicting changes in both these variables. Ideally, the variable that incorporates the most information as to the fundamental value of the traded assets will appear exogenous with respect to the other variable. If the local stock market indices better reflect the changes in the underlying fundamental determinants of asset value than the CECF prices, then future CECF price changes will tend to be explained by current index changes and not the reverse. Alternatively stated, the index will tend to appear exogenous while we will tend to reject exogeneity of the CECF price changes. If CECF prices are closer to fundamentals then the opposite relationship will hold. Ideally. If both variables appear to contain information about each other, then we ought to pay closer attention to the nature of the exceptions. The fundamental issue of interest is, therefore, if indices predict CECF prices more often than the reverse.

The working sample consists of daily data for fifteen CECFs trading on the NYSE, the daily closing values of the domestic stock market indices in which the funds invest, and

the closing value of the S&P 500.<sup>10</sup> All the indices are measured in US dollars. The sample of country funds include five Latin American funds (Argentina Fund, Brazil Fund, Chile Fund, Mexico Equity and Income Fund, and Mexico Fund), and ten South-East Asian funds (First Philippine Fund, Jakarta Fund, Korea Fund, Malaysia Fund, Roc Taiwan, Taiwan Fund, Thai Fund, and Singapore Fund). Data selection was based on our expressed interest in analysing CECF pricing behaviour during financial crisis. In the case of Asia, three CEFCS, the Taiwan Fund, Roc Taiwan Fund and Singapore Fund, can be considered control variables, given the fact that these funds invest in countries which were allegedly not affected by the Asian crisis. The daily data spans a period from 1<sup>st</sup> January 1993 to 2<sup>nd</sup> June 1999, with the exception of Brazil, for which data covers the period from 4<sup>th</sup> of July 1994 to 2<sup>nd</sup> June 1999.

#### *Stationarity Tests*

The testing procedures needs to be undertaken in the context of stationarity of the variables. We conducted two unit root tests, augmented Dickey-Fuller and KPSS. The null hypothesis in the former test is that the levels of the variables contain a unit root, in the latter it is that the levels of the variables are stationary.<sup>11</sup> The number of lags used is determined using the Akaike Information Criterion (AIC) and the Schwarz Bayesian Criterion in unrestricted VAR models. The results<sup>12</sup> are unsurprising. For the vast majority of cases we are not able to reject non-stationarity of either the CECF prices or the stock index series. We also computed equivalent unit root tests for the variables in first differences, the results of which widely rejected non-stationarity, enabling us to conclude that CECF prices and stock indices are integrated of order 1.

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<sup>10</sup> No adjustments are made on the returns of the S&P 500 as regarding dividends.

<sup>11</sup> It is generally agreed that using tests with alternative null hypothesis regarding stationarity improves the reliability of the results, see chapter 4 in Maddala and Kim, *Unit Roots, Cointegration and Structural Change*, 1998, Cambridge University Press. However, one must be careful about interpretation when using the tests for confirmatory purposes. If both sets of tests fail to reject the respective nulls, or both reject the respective nulls, we do not have a confirmation. In the case of ADF, we also test for the presence of a unit root in the series before crisis periods, to ensure that the previous result of finding a unit root is not due to any structural break in the data.

<sup>12</sup> Not reported, but available from the authors on request.

Although our primary interest is not in examining the long run relation between CECF prices and stock market indices, we nevertheless apply the Johansen (1988)<sup>13</sup> maximum likelihood procedure to detect cointegration between the two series. We justify this as follows. CECFs are often rationalised as a mechanism whereby investors can gain exposure to specific emerging market risks. If the investors objective is to use CECF as a vehicle to obtain exposure to the underlying emerging country equity market as a whole, then one may expect a long run relationship to exist between the CECF prices and those obtained by a diversified investment in the underlying equity market, as measured by the relevant market index. Moreover, Frankel and Schmukler (1997) document evidence of cointegration between CECF prices and the underlying asset NAVs, which confirms an underlying economic intuition, namely that given they ultimately represent two different values of the same asset, then they should tend to move together in the long run. Furthermore, Bennett et al., (1998), suggest that the fund NAVs mimic the behaviour of the relevant country indices (of which they form a subset), although they do not present any results to corroborate their claim. These findings can be jointly rationalised if the evidence suggests that CECF prices and stock indices are cointegrated.

#### *Cointegration Tests*

Using a likelihood ratio test, we determine the lag length of the unrestricted VAR with two variables, CECF prices and US dollar values of the stock market indices. Following selection of the appropriate VAR length, and after checking the individual equations for serial correlation, we attempt to formulate the dynamic model. One of the main issues is whether to include a trend and a restricted or unrestricted constant term in the estimated model. In the absence of any economic rationale, we do not expect the potential cointegrating vector between the two series to exhibit a time trend. The importance of the constant restriction arises from difficulties in empirically distinguishing between deterministic and stochastic linear trends. Leaving the constant unrestricted will result in the solution incorporating a

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<sup>13</sup> Johansen (1988), "Statistical Analysis of Cointegration Vectors," *Journal of Economic Dynamics and Control*.

linear deterministic trend, restricting the constant makes this trend disappear. Critically, the distribution of the test statistics for both the trace and the maximal eigenvalue tests for the cointegration rank depend upon whether the restriction is imposed. Therefore, assuming no trends, we undertake multivariate cointegration tests first with unrestricted intercepts, and then assuming we detect cointegration with restricted intercepts.

Following Johansen and Juselius (1990) we construct two cointegration tests in a multivariate setting: the trace test and the maximal eigenvalue test. In the (maximum likelihood) trace test, the null hypothesis that there are at most  $r$  cointegrating vectors is tested against a general alternative, whereas in the maximal eigenvalue test the null hypothesis of  $r$  cointegrating vectors is tested against the alternative of  $r + 1$  cointegrating vectors. The results for the 15 CECFs (available on request) suggest that in general there is no cointegrating relationship between CECF prices and US dollar values of the stock market indices.<sup>14</sup>

#### *Short Run CECF/Index Relationships*

We now return to our primary objective, which is to analyse the short term relationship between CECF prices and emerging stock market prices. However, we have determined these variables are  $I(1)$ . Therefore, we proceed by constructing series of CECF returns (FR) and stock market returns (LR). Variables are defined in Exhibit A.

In analysing the short term relationship between country fund returns and stock market returns, we differentiate between crisis and non-crisis periods using dummy variables to ascertain if there is any significant behavioural change between the two periods. The crisis/non-crisis periods are defined as follows. For the Latin American countries, the crisis period is considered 6 month after the peso devaluation in December 1994. For the Asian countries we select various dates for the onset of the crisis. For the Philippines, Indonesia, Malaysia, Taiwan and Singapore the crisis period is defined as beginning in July 1997. In the

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<sup>14</sup> The exception is Korea, where tests reject at both 5% and 10% significance levels the null of no cointegrating vector. Therefore, in this case, we proceed to estimate the cointegrating vector with restricted intercepts and no trends. The results are for the Korea Fund 0.018336 (-1.0000) and for the Korean Market Fund -0.0020087 (0.10955). Normalized values are in brackets.

case of Korea, all the tests are performed with two alternatives: one with the crisis dated from July 1997 the other dated from October 1997. Similarly, for Thailand, all the tests are performed with two alternatives: one dating the crisis from July 1997 another March 1997. In all cases, the end of September 1998 is specified as the end date.

First, we estimate the unrestricted VAR (equation (1)) in two variables, CECF returns and stock market returns. We note  $\alpha_{i0}$  is a  $1 \times 2$  vector containing a constant and a dummy variable which takes the value  $D = 1$  during the crisis periods (defined previously) and is set equal to zero otherwise. We test for lag length using generalizations of the Akaike Information Criterion (AIC), and the Schwarz Bayesian Criterion (SBC), as well as using a Likelihood Ratio test and an Adjusted Likelihood Ratio Test.

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

The results of Likelihood Ratio tests on the short-run adjustments are presented in Table 1.<sup>15</sup> Effectively, we are testing for strong exogeneity or Granger-noncausality in the variables. These tests look at whether the set of the coefficients in the fitted polynomials,  $A_{12}(L)$  and  $A_{21}(L)$  are jointly zero. A vector  $A_{12}(L) \{ A_{21}(L) \}$  set equal to zero means that CECF returns {stock index returns} are not explained by the recent history of the stock index returns {CECF returns}, but only by its own recent past.

To ascertain the robustness of the full-sample results, and account for the fact that observations of the crisis period form a relatively low percentage of the full-sample, we perform tests on subsets of the full sample relating to non-crisis and crisis periods.<sup>16</sup> We inspect each equation in the VAR system, and test for serial correlation of order one or higher as well as for heteroskedasticity. If either are present we will have inconsistent estimators. If heteroskedasticity is present, we employ White's heteroskedasticity-consistent estimates of the variance-covariance matrix of the parameter estimates. When serial correlation and

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<sup>15</sup> These results are corroborated by standard pairwise Granger causality tests using two alternative Lagrange Multiplier tests.

<sup>16</sup> Naturally  $\alpha$  then reflects simply a constant and does not incorporate a dummy.

heteroskedasticity are present, we employ a ‘degree of freedom adjusted’ version of the Newey-West variance-covariance matrix of the parameter estimates. This leaves us with robust estimates and standard errors but with few alternatives for testing the restrictions on the coefficients in the VAR’s equations apart from the Wald test. The results are summarised in Table 2.

Overall, the general conclusion that we draw from the results of the full sample and the associated sub-samples for both crisis and non-crisis periods is that stock market returns and CECF returns each contain information about future short-run values of the other variable. To the extent that both variables reflect past information which is contained in the net asset values of the underlying assets, such a result might be acceptable. However, there are interesting exceptions. For the two Taiwanese country funds and Taiwan stock market returns, the returns on the local stock market in non-crisis periods do not contribute to explaining Taiwanese CECF returns. As Taiwan was one of our control group, this result is potentially significant. However, the same results holds for Malaysia, Brazil and one of the two Mexican funds. In these cases, strong exogeneity of CECF returns is accepted; moreover, they appear to contribute to explaining stock market returns. These results may suggest the fact that although CECFs are responsive to events in the emerging market, during periods of non-crisis CECF trading can be self-determining. Moreover, it suggests that foreign investors might be inclined to assess the potential of the local assets from a more global perspective, meaning in the context of a particular region, rather than according to the unique dynamics of each market. We note that such a behavioural tendency would be a natural source of contagion in the event of a crisis. The implicit assumption made in deriving this argument is that country funds both invest in a particular market and sufficiently diversify their investment so as to constitute an efficient portfolio, whose returns are expected to emulate those on the market index. Otherwise, we would have no reason to expect local market returns to be predictive of CECF returns in the first place. The issue then becomes if we can consider emerging markets to have sufficient depth and liquidity to develop accurate asset-oriented signals.

### *Foreign Investor Sentiment*

We now turn to investigate the impact of foreign investor sentiment in more detail. We focus our discussion on two related questions. The first asks if the influence of CECF returns on the relevant stock market returns may be an indirect reflection of the global impact of US market sentiment. The second further inquires if the contribution of CECF returns in explaining returns in the underlying stock markets can be identified with foreign investor sentiment distinct from a US market sentiment. We suggest that one way of distinguishing between these two influences is to estimate an unrestricted VAR in three variables, emerging stock market returns, US market returns as represented by the returns of the S&P 500, and CECF returns. Once again, we delineate crisis from non-crisis periods by utilising sub-samples. The question we address is whether CECF fund returns influence the relevant stock market returns, once we control for the U.S market sentiment, measured by returns on the S&P 500 index, an approach suggested by Hardouvelis, La Porta and Wizman (1994) and others.<sup>17</sup>

Given our previous results, we only utilise one of the equations from the VAR system, that regressing the relevant stock market return ( $LR_t$ ) on lagged US market and CECF returns, as specified in equation (2). Correcting for heteroskedasticity and (or) serial correlation, we test the restrictions that the coefficients of the lagged values of the country fund returns  $A_2(L)$ , are equal to zero.

$$(2) \quad LR_t = \alpha_0 + A_1(L) LR_{t-1} + A_2(L) FR_{t-1} + A_3(L) US_{t-1} + \varepsilon_t$$

The results are presented in Table 3 and indicate the following. During both crisis and non-crisis periods, past values of CECF returns appear to contribute to explaining stock market returns, controlling for the impact of U.S market returns. In each sub-sample we only have one exception. During non-crisis periods, the stock market in Singapore seems to be immune from the influence of foreign sentiment, as may be expected of a mature equity market. However, once the crisis starts, this market joins the others in apparently responding

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<sup>17</sup> Hardouvelis et al., (1994), "What Moves the Discount on Country Funds?" in J.Frankel, ed., The Internationalization of Equity Markets, University of Chicago Press, 1994.

to foreign sentiment. During the crisis, the Malaysian market is less responsive to past CECF returns. The following section compares our results with findings of other authors and concludes.

#### **IV. Summary and conclusions**

Both Frankel and Schmukler (1996) and Bennett et al., (1998) argue that local investors were the front runners in the financial crisis recently witnessed in Latin America and Asia. While we would certainly not wish reject this possibility, our results do call into question some of the evidence Bennett et al., (1998) present in support of this conclusion,<sup>18</sup> which may be summarized as follows. During periods of non-crisis, daily movements in the local stock markets exert strong effects on CECF returns. The onset of the crisis weakens the effect of local fundamentals on fund returns. In turn, during non-crisis periods, the foreign investor sentiment has a weak impact on the local stock markets, although its effect seems to be stronger during the crisis. Moreover, despite its weakness before crisis, Bennet et al. argue that foreign investor sentiment in its pessimistic version contributed to the depreciation of the Asian currencies.

The above conclusions are based on data observations which are almost instantaneous, imposing a specific structure on the dynamic feedback effects in the model. Specifically, Bennett et al., utilise open to close, overnight, and close-to close fund and index returns. By restricting the maximum lag length to one trading period, they construct the qualitative relationship between CECF returns and stock market returns on an estimation procedure which analyses the response of one variable in relation to the immediately preceeding change in the other. In effect they suggest that because CECF returns fail to incorporate what happened in Asia up to five hours ago during crisis periods, local fundamentals in Asia exert less overall influence on CECF returns than the reverse during these periods. We beleive that they are really testing test for the speed of information transmission from one index to the other and not for the strenght or significance of the

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<sup>18</sup> We refer in particular to the Bennett et al. paper since we employ similar explanatory variables, facilitating comparison of the findings.

adjustment, which may take more than one trading period to fully manifest itself. We maintain that even during non-crisis periods, there is no evidence indicating that unless markets react immediately to outside events, then they will fail to respond to them at all.

To strengthen our case, we replicate their estimation procedures on our expanded data sample (including Latin America). However, we allow for more than one lag of each of the variables appearing in their estimation.<sup>19</sup> We correct for misspecification in the form of serial correlation and heteroskedasticity, and employ a Wald test of restrictions on the lagged value of the relevant variables. The results confirm the output of the block exogeneity Granger-noncausality tests, indicating that the relationship between local fundamentals and CECF returns does not significantly change during crisis periods. None of the Asian countries present any evidence of a weakening relationship between CECF and stock market returns during crisis periods except the Thai and Singapore funds (the latter of which is not considered in Bennett's et al.'s sample). In Latin America, the Argentine and Mexico Equity and Income Funds show some evidence of the effect documented in Bennett et al. However, in the case of Mexico, the reaction is more likely to be a strengthening rather than a weakening of the relationship, since there are more significantly positive lagged coefficients than negative ones.

One interpretation of this study is that it is less concerned with identifying who were the frontrunners in a crisis but concerned with searching for the factors which enhanced its depth and cross border dimension. In this sense, our results suggest that foreign investor sentiment, having a pervasive effect on stock market returns, still remains a serious candidate among the factors which sustained the dimension and duration of the crisis.

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<sup>19</sup> These results are available on request. We note that when we undertook to replicate the Bennett et al. tests with one lag, we obtained very similar results to these authors.



**TABLE 1 : Likelihood Ratio Tests of Block Granger-Non-Causality**

<b>COUNTRY FUND</b>	<b>LR test of block non-causality Null hypothesis : Index returns Do not influence fund returns</b>	<b>LR test of block non-causality Null hypothesis: Fund Returns Do not influence index returns</b>	<b>OPTIMAL VAR length</b>
PHILIPPINE	CHSQ = 72.305 [0.000] *	CHSQ = 96.536 [0.000] *	12
INDONESIA	CHSQ = 82.14 [0.000] *	CHSQ = 143.77 [0.000] *	24
MALAYSIA	CHSQ = 58.855 [0.000] *	CHSQ = 99.34 [0.000] *	20
TAIWAN	CHSQ = 9.23 [0.010] **	CHSQ = 59.45 [0.000] *	3
ROC TAIWAN	CHSQ = 7.47 [0.113]	CHSQ = 32.88 [0.000] *	4
SINGAPORE	CHSQ = 9.473 [0.002] *	CHSQ = 38.45 [0.000] *	1
THAILAND - July	CHSQ = 69.057 [0.000] *	CHSQ = 76.987 [0.000] *	13
THAILAND March	-	-	-
KOREA -July	CHSQ = 69.744 [0.000] *	CHSQ = 129.58 [0.000] *	24
KOREA – Oct	-	-	
ARGENTINA	CHSQ = 94.302 [0.000] *	CHSQ = 34.38 [0.000] *	9
BRAZIL	CHSQ = 15.78 [0.608] +	CHSQ = 69.489 [0.000] *	18
CHILE	CHSQ = 83.86 [0.000] *	CHSQ = 84.46 [0.000] *	15
MEXICO	CHSQ = 10.713 0.380]	CHSQ = 132.543 [0.000] *	10
MEXICO (EQ & INC)	CHSQ = 49.53 [0.000] *	CHSQ = 82.828 [0.000] *	18

+ LR denotes likelihood Ratio Test

\* significant at 5%

\*\* significant at 10%

**TABLE 2 : TEST OF STRONG EXOGENEITY : BLOCK GRANGER – NON-CAUSALITY**

Sub-sample of Non-crisis/crisis periods with White or Newey-West corrections as appropriate

<b>COUNTRY FUND</b>	<b>Non-Crisis Periods</b>		<b>Crisis Periods</b>	
	<b>Index returns impact on fund returns</b>	<b>Fund returns impact on index returns</b>	<b>Index returns impact on fund returns</b>	<b>Fund returns impact On index returns</b>
PHILIPPINE	Yes	Yes	Yes	Yes
INDONESIA	Yes	Yes	Yes	Yes
MALAYSIA	No	Yes	Yes	Yes
TAIWAN	No	Yes	Yes	Yes
ROC TAIWAN	No	Yes	Yes	Yes
SINGAPORE	Yes	Yes	Yes	Yes
THAILAND-July	Yes	Yes	Yes	Yes
THAILAND-March	Yes	Yes	Yes	Yes
KOREA – July	Yes	Yes	Yes	Yes
KOREA – Oct	Yes	Yes	Yes	Yes
ARGENTINA	Yes	No	Yes	Yes
BRAZIL	No	Yes	Yes	Yes
CHILE	Yes	Yes	Yes	Yes
MEXICO	No	Yes	Yes	Yes
MEXICO EQ INC	Yes	Yes	Yes	Yes

**TABLE 3: TEST OF BLOCK GRANGER – NON-CAUSALITY CONTROLLING FOR US SENTIMENT**

Sub-sample of Non-crisis/crisis periods with White or Newey-West corrections as appropriate

<b>COUNTRY FUND</b>	<b>Non-Crisis Periods</b>		<b>Crisis Periods</b>	
	<b>Index returns impact on fund returns</b>	<b>Fund returns impact on index returns</b>	<b>Index returns impact on fund returns</b>	<b>Fund returns impact On index returns</b>
PHILIPPINE	N/A	Yes	N/A	Yes
INDONESIA	N/A	Yes	N/A	Yes
MALAYSIA	N/A	Yes	N/A	No
TAIWAN	N/A	Yes	N/A	Yes
ROC TAIWAN	N/A	Yes	N/A	Yes
SINGAPORE	N/A	No	N/A	Yes
THAILAND-July	N/A	Yes	N/A	Yes
THAILAND-March	N/A	Yes	N/A	Yes
KOREA – July	N/A	Yes	N/A	Yes
KOREA – Oct	N/A	Yes	N/A	Yes
ARGENTINA	N/A	Yes	N/A	No
BRAZIL	N/A	No	N/A	Yes
CHILE	N/A	Yes	N/A	Yes
MEXICO	N/A	Yes	N/A	Yes
MEXICO EQ INC	N/A	Yes	N/A	Yes

**EXHIBIT A: Definition of the variables used in regressions**

<b>Notation</b>	<b>Definition of Variable</b>	<b>Variable Calculation</b>
$LR_t$	Local stock market dollar return in relevant market from close of trading period t-1 to t	$\log L_t - \log L_{t-1}$
$LR_{t-1}$	Local stock market dollar return in relevant market from close of trading period t-2 to t-1	$\log L_{t-1} - \log L_{t-2}$
$FR_t$	CECF return in New York from close of trading period t-1 to close of period t	$\log F_t - \log F_{t-1}$
$FR_{t-1}$	CEFC return in New York from close of trading period t-2 to close of period t-1	$\log F_{t-1} - \log F_{t-2}$
$US_t$	S&P 500 return in New York from close of trading period t-1 to t	$\log SP_t - \log SP_{t-1}$
$US_{t-1}$	S&P 500 return in New York from close of trading period t-2 to t-1	$\log SP_{t-1} - \log SP_{t-2}$
$D_t$	Dummy variable equal to 1 during the crisis And equal to 0 otherwise	See text