

Information flows during the Asian crisis: Evidence from closed-end funds

Benjamin H Cohen*

Bank for International Settlements
Centralbahnplatz 2
CH-4002 Basel, Switzerland
Tel: +41 61 280 8421
Fax: +41 61 280 9100
E-mail: ben.cohen@bis.org

Eli M Remolona

Bank for International Settlements
Representative Office for Asia and the Pacific
78th Floor, Two International Finance Centre
8 Finance St, Centre
Hong Kong SAR, China
Tel: +852 2878 7150
Fax: +852 2878 7123
E-mail: eli.remolona@bis.org

Abstract

We test for the direction of information flow between US and Asian equity markets by comparing prices in Asian equity markets with prices of US-based closed-end funds that invest in those markets. We find that the premia of the funds' prices over their net asset values tended to rise during the 1997-98 crisis. Second, exploiting the fact that trading hours in the two regions do not overlap, we find that the day-to-day influence of local market returns on corresponding fund returns fell during the crisis, while effects in the opposite direction rose somewhat. This suggests that US market sentiment assumed a relatively more important role in driving Asian market developments during the crisis, while US investors were relatively less influenced by the views of Asian investors.

JEL classification codes: F30 (International finance – general), G14 (Information and market efficiency), G15 (International financial markets).

Keywords: Closed-end funds, Asian crisis, emerging markets, information flow.

* - Corresponding author.

1. Introduction

Did the financial turmoil that affected many emerging economies in the middle and late 1990s stem primarily from developments within those economies or from events in financial markets in the industrial countries? Those emphasising local developments, such as Fischer (1998) have pointed to poor policy choices in the emerging economies, particularly in such areas as exchange rate policy, banking supervision and corporate governance. Capital outflows, in this view, represented a common shift of views by both domestic and foreign investors, or even “front-running” by better informed domestic investors. Those emphasising developments in industrial-country markets, such as Krugman (1998) and Radelet and Sachs (1998), note the suddenness and magnitude of the reversal in capital flows to the emerging economies, and the fact that, on the arrival of bad macroeconomic news from certain countries, markets seemed to “punish” geographically similar but otherwise sound economies with high credit risk premia and reduced capital market access. Adherents of this line of thinking characterise the crisis as a self-fulfilling panic stemming from a shift in risk appetites on the part of foreign investors.

This paper provides an insight into two key aspects of this debate. First, in the period surrounding the crisis, did domestic and foreign investors have common or divergent views about asset values in the affected economies? Second, did information about valuations flow from the domestic market to overseas markets, or vice versa? For both of these questions, the key issue is whether, and to what extent, these patterns of valuation and information flow represented a departure from previous experience. In this study, “information” is defined broadly to include anything that might have a material effect on market returns, including changes in investor sentiment.

To test for divergences in views about asset values, we examine the extent to which the prices of US-based closed-end funds (CEFs) that invest in several East Asian equity markets diverge from

their net asset values (NAVs). A substantial change in the premia or discounts of prices over NAVs during the crisis should indicate a change in the relative valuations of assets by US and Asian investors.

To test for shifts in information flows, we compare the daily returns on the CEFs to the corresponding local Asian market returns. This analysis should tell us about the day-to-day direction of information flows between the two groups of investors. It relies on the fact that there is essentially no overlap between the trading hours in the two regions. This means that we can safely assume that all of the information incorporated into a day's trading in Asian markets will be available to those trading the funds in the US that same day. Similarly, the information incorporated in a day's closed-end fund trading is fully available for the next day's trade in Asia. This approach should offer a more precise test of shifts in the direction of information flows, and indirectly of shifts in the relative roles of foreign and domestic investor sentiment in price formation, than do analyses of the time series characteristics of fund prices and NAVs. At the time of the crisis NAVs were available only at a weekly frequency.

Both tests should be informative to the extent that the populations of investors in the two markets differ. A primary function of closed-end funds focussed on specific countries is to allow investors in mature markets to gain exposure to the corresponding emerging markets, without requiring them to trade directly in those markets. Comparing fund valuations and local market values might be less useful, however, if the sentiments of foreign investors have a disproportionate influence on price movements in local Asian markets. Foreign equity investors as a group certainly are numerically prominent in certain local markets in Asia; for example, in the Korean stock market, foreign investors held 12% of market capitalisation at 2 December 1996 and 15% at 27 December 1997 (Choe et al, 1999). However, it seems reasonable to assume, at the very least, that local

investors have a relatively greater influence on local market valuations than they do on the valuations of US-based closed-end funds.

On the valuation question, we find that the funds' prices move from a discount to NAV to a premium after the crisis started. This result confirms the findings of earlier authors, including Frankel and Schmukler (1996) and Kramer and Smith (1995) for Mexico. The sentiment of US investors appears to have decoupled from that of Asian investors during the crisis, and if anything became more positively inclined towards the Asian countries' economic prospects. In this sense our results support those of Choe et al (1999), who find that foreign investors in the Korean equity market followed momentum (positive feedback) strategies before the crisis and contrarian (negative feedback) strategies during the crisis.

On the timing question, we find that information about Asian market returns, as measured by the degree to which movements in one geographic area lead or lag those in the other, tended to flow from the Asian markets to the US market before the "crisis period" beginning in July 1997, but that US market returns assumed a relatively more important role during the crisis. We also find that the funds were more reflective of the broad US market return during the crisis period. This suggests that the shift in causation from Asia to the US that took place during the crisis reflected a greater role for US market sentiment, rather than for the news that became known during US trading hours.

Our approach is similar to that of Bowe and Domuta (2001), who estimate an error-correction model between closed-end fund returns and local market returns observed on a daily basis as well as estimating the interaction between fund returns, local returns and US market returns on a daily basis. Like us, they find some evidence of an impact from foreign investors (as proxied by fund returns) on local markets, as well as evidence that this effect strengthened during the 1997-98

crisis. We build on their results by focusing on the lead-lag patterns in daily returns, rather than on the time series and error-correction characteristics of the price data.

Our results shed light on the “front-running” hypothesis tested by Frankel and Schmukler (1996). They use Granger causality analysis to show that local investor sentiment may have led that of foreign investors ahead of Mexico’s 1995 financial crisis. Our findings for daily fund returns suggest that, in the pre-crisis period, local returns did indeed lead foreign returns, so some front-running may have taken place. However, this relationship breaks down during the crisis, suggesting that foreign investors no longer looked to local investors for information about how day-to-day developments ought to affect asset valuations.

The next section examines how the characteristics of closed-end country funds can shed light on the information flow debate, and how previous authors have used these characteristics to analyse changes of sentiment across different groups of investors. Section 3 describes the funds and local returns used in this study and analyses the behaviour of fund premia and discounts over the period studied. Section 4 presents results on spillovers of the level of day-to-day returns before, during and after the crisis. Section 5 concludes.

2. Closed-end country funds

Closed-end country funds are traded investment vehicles that hold portfolios consisting of shares in firms based in a specific country or group of countries. As with other types of closed-end fund, after a country fund’s initial offering, new investors can obtain shares in the fund only by purchasing them from other investors. In contrast to domestically oriented closed-end funds, which tend to trade at a discount to their NAVs, US-based funds that specialise in stocks from

foreign countries can trade at both large premiums and large discounts (Bodurtha et al, 1995; Bonser-Neal et al, 1990).

Recent research on closed-end funds has emphasised the role of differences in “sentiment” between the clienteles that invest in the funds and those that invest in the underlying shares as an explanation for the divergence of fund prices from NAV (see for example Lee et al (1991)). For country funds, an additional factor influencing the divergence of prices from NAVs is the presence of barriers to the access of foreign investors to local markets. These barriers include legal restrictions, transaction costs and liquidity premia. They have the effect of enhancing the impact of differences in sentiment, by reinforcing the distinction between the investment clienteles of local markets and those of closed-end funds.

Bonser-Neal et al (1990) find that announcements of reductions in barriers to foreign investment tend to cause fund prices to decline relative to NAVs, regardless of whether the fund had previously been trading at a premium or a discount. The fact that reduced barriers to foreign investment tend to reduce fund premia and increase discounts, rather than reducing the divergence of price from NAV in either direction, would argue against the view that free cross-border portfolio flows drive fund prices and NAVs together (by facilitating arbitrage) while restrictions on flows drive them apart. Instead, it indicates that investors in country funds are willing to accept relatively lower returns (high premia) when barriers are high, and that removing these barriers reduces one of the attractions of the funds, causing the fund price to fall until investors again are satisfied with the prospective returns. In other words, the funds are more attractive to foreign investors, the stronger are the barriers that keep such investors out of local markets.

The countries in the present study were generally open to foreign portfolio investment, if imperfectly so, in the period under consideration.¹ This suggests that differences in sentiment between domestic and foreign investors are likely to have played an important role in driving differences between fund returns and local market returns, while changes in access to local markets probably played a relatively minor role.

Previous studies of country fund behaviour have found that divergences between country-fund prices and NAVs contain useful information about the differing sentiments of local and foreign investors. Bodurtha et al (1995) find that movements in the premia of country fund prices over their NAVs are highly correlated with one another and tend to reflect US stock market returns, implying an important role for US investor sentiment in fund returns. Chan et al (2001) find that NAVs of funds tracking a given country tend to be more highly correlated than are the corresponding fund prices, a result that the authors interpret as showing that local investors tend to have more homogeneous expectations about stock market returns than foreign investors. Hardouvelis et al (1994) provide further support for the role of investor sentiment in determining fund prices, including evidence that country-fund discounts drive fund returns but not NAV returns, that common components drive discounts on different country funds, and that fund returns are excessively sensitive to broad US and world market returns.

Attempts to use fund prices and NAVs to infer the *direction* of information flows between local and foreign investors, however, have produced inconsistent results. Frankel and Schmukler (1996, 2000) find that NAVs tend to “cause” fund-price changes in a Granger sense, while the effect in the opposite direction is weak or absent. Pan et al (2001), studying six Asian stock

¹ For example, Korea opened its stock market to foreign investors in 1992, although it imposed ceilings on foreigners' shareholdings in individual companies. These restrictions were slowly loosened over the next few years, then removed

markets, obtain the opposite result, namely that fund prices tend to Granger-cause NAVs for all six countries studied while the opposite relationship only holds for three of the countries. Kim (1999), studying prices and NAVs of three Korea-linked funds, detects Granger causality in both directions.

A number of these authors also attempt to determine whether, and in what ways, these relationships change during crisis periods. Frankel and Schmukler (1996) find that the NAVs on three closed-end funds investing in Mexico tended to trade at a discount before the country's December 1994 crisis and at a premium afterwards, suggesting that foreign investors were relatively more optimistic than their local counterparts. Pan et al (2001) find that Granger causality from prices to NAVs grew stronger during the Asian crisis, while that from NAVs to prices grew weaker. Chan et al (2001) find that the difference between the correlation of NAVs and the correlation of fund prices was not statistically significant during the Asian crisis, suggesting that the local investors' pattern of expectations had shifted in some way.

3. The behaviour of premia

For the present study, closed-end funds are identified that represent the five Asian countries considered to have been most affected by the 1997-98 crisis: Korea, Indonesia, Thailand, Malaysia and the Philippines. We include two funds that invested in each of Korea, Indonesia and Thailand, and one fund investing in each of Malaysia and the Philippines. As a control, we also include two funds for Taiwan, which was relatively less affected by the crisis than the other five

entirely (except for a few protected sectors) in 1998 as part of the reform program enacted in response to the financial crisis. See IMF Independent Evaluation Office (2003) and Lane et al (1999).

countries. This produces a sample of 10 funds from six countries. Most of the funds were started in the late 1980s and early 1990s.

Eight of the 10 funds sold at prices that were, on average, at a positive premium to their NAVs during 1990-99 (Table 1). Five of these were still at a premium on the last day of 1999. For each of the 10 funds, there were times during the sample period when it sold at a premium and times when it sold at a discount. Premia tended to be closely correlated for those countries for which two funds are observed, suggesting that investor sentiment specific to the country concerned, rather than factors unique to a specific fund such as the perceived abilities of the fund managers, tended to be the key factor moving the premia (Table 2).² Correlations of premia for funds from different countries are not especially high. The figures in the bottom five lines in Table 2, however, seem to be consistently higher than those in the top four lines, suggesting that premia for Thailand, Indonesia, Malaysia and Philippines funds were more closely synchronised with one another than they were with those for Korea and Taiwan funds, or than the Korea and Taiwan premia were with each other.

It will be useful to define the period from 1 July 1997 to 31 October 1998 as the “crisis period”. This covers the time from the floating of the Thai baht on 2 July 1997 to the stabilisation of markets in the course of October 1998, and thus corresponds roughly to the most acute phase of the crisis in terms of economic developments in the region itself.³

² Premia are defined here and elsewhere in the paper as the log of the ratio of price to NAV. The term “premium” will be used generically to refer to this quantity, even when the price is below the NAV, creating a negative premium (in which case the term “discount” will occasionally be used).

³ In terms of disruptions to global financial markets, crisis conditions can be said to have persisted until later in 1998, or even into the early months of 1999. See Moreno et al (1998) and BIS (1998, 1999a, 1999b) for narrative reviews of the evolution of the Asian crises and Lane et al (1999) for an in-depth review of the crises in Indonesia, Korea and Thailand.

Premia rose for all of the funds from the crisis countries starting in mid-1997 (Figures 1-3). For some countries, such as Korea and Indonesia, the jump in premia was quite sudden, while for others, such as Thailand, a gradual increase in premia can be detected from late 1996 onwards. By early 1998, all of the funds from the five crisis countries traded at positive premia. Premia declined gradually in the course of 1998 and 1999 in most cases, though for some, especially the two Thailand funds, they remained high and volatile through late 1999. Average premia during the July 1997-October 1998 crisis period were significantly higher than those for January 1990-June 1997 for seven of the eight funds studied from the crisis countries (Table 3, second column). Two funds moved from a discount to a premium, while in four cases the premium increased. The First Philippines Fund saw a large discount replaced by a significantly smaller discount. In only one case, the Korea Fund, did the premium fall.

In contrast to the funds from the five crisis countries, the two funds from Taiwan exhibited discounts throughout the crisis period (Figure 1). There were brief periods of turbulence, particularly for the Taiwan Fund in early January 1998, but there was no persistent shift from discount to a premium. In fact, one of the Taiwan-based funds moved from a premium to a discount, while for the other the discount actually increased.

After the crisis, premia tended to return towards pre-crisis levels, though the process was uneven across countries. Average premia in the 14 months following October 1998 were significantly lower than during the crisis period for five of the eight funds from crisis countries (Table 3, third column). The prices of the two funds investing in Korea moved decisively below their NAVs in the course of 1999. The premium on the Malaysia Fund, by contrast, increased slightly, despite the country's economic recovery. The contrasting results for Korea, which removed restrictions on foreign stock-market investment in 1998, and Malaysia, which imposed controls on cross-

border foreign exchange and portfolio flows in September 1998, are consistent with the finding of Bonser-Neal et al regarding the relationship between investment barriers and fund premia. The discounts on the two Taiwan funds narrowed after the crisis period, while remaining wider than pre-crisis levels.

These observations generally coincide with Frankel and Schmukler's (1996) findings for Mexico in 1994-1995. They also appear to support their interpretation of those findings, namely that foreign investors in the crisis countries tended to be more optimistic than local investors during the crisis period. After the crisis, jumps in the fund premia were reversed for Korea, the Philippines and Indonesia, but not for Thailand or Malaysia. For Taiwan, however, the divergence in sentiment moved in the opposite direction: the discount widened during the crisis and then narrowed afterwards. US investors turned bearish on Taiwan, perhaps because of problems elsewhere in the region, while local investors remained calm.

4. A three-factor model of daily price changes

Comparisons of fund prices and NAVs offer an indication of the relative levels of sentiment of US and Asian investors, but because NAVs were available on only a weekly basis at the time of the crisis⁴ such comparisons cannot tell us whether and in what ways the information revealed in US and Asian market trading influence returns in the respective markets. A weekly announcement of a fund's NAV should contain little or no new information for a fund investor who has been following local market developments throughout the week.⁵ In this section, we

⁴ Starting in 1999, most of the funds in this study moved towards daily NAV announcements.

⁵ Correlations between weekly log changes in NAVs (or the average change where two country funds were present) and weekly local market returns (for the same market index as that used in constructing LR_t^i) range from 0.44 for Indonesia to 0.79 for Taiwan.

attempt to learn about the direction of information flows between US and Asian markets, by comparing daily fund returns to daily returns on local equity indices, relying on the fact that the two markets are open at different times.

Evidence on the timing of securities returns on essentially identical securities in different markets – i.e. on whether price movements in one market tend to lead or lag price movements in the other – can be informative either about the timing of the arrival of news relevant to fundamental valuations, or about the timing of changes in sentiment regarding the level or riskiness of expected returns. In the case of Asian markets and US closed-end funds, it is likely that most, though not all, of the fundamental news becomes known during Asian trading hours. Exceptions might be official statements or policy decisions (such as IMF programme announcements) by institutions located in the United States and Europe. Significant changes of sentiment, on the other hand, could conceivably occur among either US or Asian investors, and would be reflected in price movements at the time that the investors are actively engaged in trading. A finding that returns in US-based closed-end funds led returns in local markets would thus be evidence for the importance of US investor sentiment in determining local market returns. A finding that returns in the local markets led those in the funds, on the other hand, would be less conclusive. While such a finding could indicate an important role for local sentiment, both the local and fund returns could simply be reacting to local news.

4.1 Impact of Asian local returns on US country funds

First we model the 24-hour (close-to-close) price movements of the local market return and the return on the closed-end fund using a simple three-factor model. The fund return is related to that day's US dollar return on the corresponding local market index, the average US dollar return on

local market indices for the other five countries in the region, and the return on the Standard and Poor's 500 stock index, as follows:

$$\begin{aligned}
FR_t^i = & \beta_0 + \beta_1 LR_t^i + \beta_2 RR_t^i + \beta_3 US_t + \\
& \beta_4 d_t^{797} + \beta_5 d_t^{797} LR_t^i + \beta_6 d_t^{797} RR_t^i + \beta_7 d_t^{797} US_t + \\
& \beta_8 d_t^{1198} + \beta_9 d_t^{1198} LR_t^i + \beta_{10} d_t^{1198} RR_t^i + \beta_{11} d_t^{1198} US_t + \\
& \beta_{12} d_t^{US\ Sun,hol} + \beta_{13} FR_{t-1}^i + \varepsilon_t^i - \zeta \varepsilon_{t-1}^i
\end{aligned} \tag{1}$$

where i indexes funds and countries. The variables are defined as follows:

FR_t^i : The daily log change in the closing price of the fund. Close-to-close returns are used. For Malaysia and the Philippines, FR_t^i is the return on the single fund that was available for the corresponding country. For the other four countries, two funds are available. For Indonesia and Thailand, FR_t^i is the average of the two daily fund returns corresponding to each country. For Korea and Taiwan, FR_t^i is the return on, respectively, the Korea Fund and the Taiwan Fund only.⁶

LR_t^i : The daily log change in the closing level of the local stock market index corresponding to the fund, in US dollar terms. For most of the markets studied, a “broad” and a “narrow” market index were available. Where possible, we use the “narrow” indices, in order to match the tendency for the country funds to buy shares of a relatively small number of large-capitalisation stocks in their respective markets.⁷ Asian-close exchange rates were used to translate the local currency returns into dollar returns.

⁶ This is done because price data on the other funds (the Korean Investment Fund and the Taiwan Equity Fund) are only available from February 1992 and July 1994 respectively. Dropping these funds from the estimation ensures that all of the regressions cover a more or less identical time period, namely 1990-99. It also allows the portfolio variable, described below, to cover the 1990-99 time period. The returns of the dropped funds are highly correlated with those of the respective included funds for each country.

⁷ For example, the Indonesia Fund invested in 23 local issues as of 30 June 1999, of which seven constituted more than half of the fund's holdings. On the same date, the Thai Fund was invested in 26 local issues, with more than half of its holdings accounted for by ten issues. The following local indices were used: KOSPI 200 (Korea), Bangkok SET (Thailand), Jakarta LQ-45 (Indonesia), KL Composite (Malaysia), Philippines Composite, TWSE Weighted (Taiwan).

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

$$RR_t^i = \left(\frac{1}{5}\right) \sum_{j \neq i} LR_t^j . \quad (2)$$

US_t : The daily log change in the S&P 500 index.

d_t^{797} , d_t^{1198} : Dummy variables taking the value one after, respectively, 1 July 1997 and 1 November 1998, and zero before those dates.

$d_t^{US \text{ Sun, hol}}$: A dummy variable taking the value one on weekdays following days when the US market was closed and zero on other dates. Including this dummy variable corrects for the tendency of markets to move in an unusual way on the day after a weekend or holiday.

This specification has a number of important features.

- It permits the fund return to reflect both a US market factor (US_t) and a regional market factor (RR_t). We thus accommodate the findings of Diwan et al (1995) and Bodurtha et al (1995), who find that US-based country fund returns reflect both US market returns and home market returns. The regional factor allows for the possibility of contagion effects. US investors might take information from a regional return into account when pricing the country fund, even if the regional return has not yet been incorporated (or has not yet been fully incorporated) into the local market.
- We include the lagged fund return as an independent variable to correct for autocorrelation, which was found to be present in many of the fund returns. Because local-market returns are themselves likely to reflect the previous day's country-fund returns (as will be discussed below), we want to eliminate the impact of autocorrelation in the country-fund returns as

much as possible and focus on the extent to which news from the day's local-market returns is incorporated into the country-fund return.

- Using two dummy variables, d_t^{797} and d_t^{1198} , lets us ask not only whether price behaviour differs during the crisis period compared to the pre-crisis period, but also whether markets returned to their previous behaviour in its aftermath.
- A moving average (MA(1)) term is included in order to account for bid-ask bounce and other factors that might induce spurious serial correlation in the error term.

Equation (1) is also estimated for a hypothetical “portfolio” containing equally weighted positions in funds corresponding to each of the six countries (that is, each *country* is equally weighted; as noted above, two of the countries are represented by two funds). For the portfolio estimation exercise, the dependent variable is the average of the six fund returns, LR_t^i on the right-hand side is replaced with the average of the six local returns, and right-hand terms in RR_t^i are dropped.

The purpose of the portfolio estimation is to provide a summary measure of the effects we are attempting to document. It also provides an indication of the tendency of investors to base portfolio allocation and valuation decisions on the region as a whole, as opposed to individual countries. If foreign investor sentiment primarily reflects views on regional, rather than local, developments, then the impact of foreign investor sentiment on local returns and vice versa ought to be apparent from the relationship between daily returns on a portfolio of funds and daily returns on a portfolio of local market indices. If foreign investors focus primarily on local developments, and if these developments do not coincide chronologically, then the portfolio estimation might be expected to produce weak or inconclusive results.

The first panel of Table 4 presents results of the estimation of equation (1) by OLS for this six-fund portfolio and for the fund returns for the six countries in our sample. The second panel of Table 4 reports the total effects during the crisis (7/97–10/98) of the local, regional and US return variables (i.e. the sum of the coefficient on the return variable itself and the coefficient on the interaction of the return with the post-July 1997 dummy variable) for each equation. For example, the figures next to LR_t^i in the second panel are $\beta_1 + \beta_5$ from each regression. The third panel reports the total effects of these variables for the 11/98–12/99 period. For example, the figures next to LR_t^i in the third panel are $\beta_1 + \beta_5 + \beta_9$ from each regression.

During all three periods studied, both the local market return and the US market return are positive and significant (at the 5% significance level) for each fund return and for the portfolio of funds. This confirms the findings of Diwan et al (1995) and others regarding the influence of the broad US market on country fund returns. The adjusted R^2 statistics indicate that the model explains between 22 and 35% of daily fund returns over the sample period, and 45% of the returns on the portfolio of funds.

The changing nature of the process underlying the daily country fund returns can be most clearly seen by examining the model for the portfolio of funds in the first column. Before July 1997, the average of the local market returns has an impact on the portfolio return that is substantially higher than that of the US market return; the coefficients are 0.83 and 0.52 respectively. During the Asian crisis, both factors are still significant, but their relative weights shift sharply: to 0.43 (summing the relevant coefficients) for the regional average and 1.04 for the S&P 500. This suggests that, during the Asian crisis, the attitudes of US investors towards Asian markets became decoupled from those of local investors, and became more closely tied to patterns of

investor sentiment within the US market. After October 1998, pre-crisis conditions again prevail: the coefficient on the local return rises to 0.81 while that on the S&P 500 falls to 0.55.

In the five crisis countries, these results are echoed in most of the individual country regressions. Before July 1997, a remarkably consistent fraction – between 0.46 and 0.60 – of each country's daily local return is reflected in corresponding closed-end fund returns. The broad US market return is also an important factor for country closed-end funds, with a coefficient on the S&P 500 index ranging from 0.32 to 0.62. The regional return, reflecting overall investor sentiment in Asian local markets, is significant for all five crisis-country fund returns before July 1997.

During the crisis, the local and regional returns tend to become less important, and the US market return more important. For all five crisis countries (that is, all of the countries studied except Taiwan), the coefficient on the local return factor falls, in three cases by a statistically significant amount. In all cases the local return remains significant. At the same time, the weight of the US market return rises sharply for all five countries, by amounts ranging from 0.30 to 1.00. During the crisis, the weight of the regional factor falls for four of the five crisis countries, becoming insignificant for two of them (the Philippines and Korea).

After October 1998, the balance again shifts back to a greater relative role for the local and regional returns, and a smaller role for the US return. The coefficient on the local return rises after October 1998 for all five crisis countries. For three of the five, the local return ends up with a higher coefficient in the post-crisis period than pre-crisis. It is notable that the two countries, Thailand and Indonesia, where this is not the case also witnessed persistently high price/NAV premia after the crisis. This suggests that the high premia correspond to a continuing divergence in sentiment between fund investors in the United States and local investors in Asia, a divergence that diminished sharply in the aftermath of the crisis for the other four countries studied. For each

of the five country fund returns, the US factor weight falls after October 1998, in three cases (Indonesia and Korea are the exceptions) to below its pre-crisis level.

The impact of the regional return rises after the crisis, but generally is weaker than it was before the crisis. The regional factor had been significant at the 95% confidence level before the crisis for fund returns for all five crisis countries, but is significant at the 95% level afterwards for only two of them (and significant at the 90% level for a third). This confirms a common anecdotal observation about a change in investor behaviour in the aftermath of the crisis, namely that investors became more careful in distinguishing between conditions in individual countries rather than making decisions on the basis of perceived investment prospects for the Asian economies (or the emerging economies) as a whole.

For Taiwan, shifts in the impact of the US return (rising during the crisis, falling thereafter) are similar to the crisis countries, but the local and regional return variables behave differently. The impact of the local return on the corresponding closed-end fund did not change to a statistically significant degree either before or after the crisis, suggesting little change in the process by which local asset values became embodied in the fund price. The regional return exerted a significant impact on the Taiwan fund's returns before the crisis. As with the crisis countries, this effect vanished during the crisis, but unlike them it remained insignificant after the crisis. In other words, Taiwan became "decoupled" from its neighbours both during and after the crisis in the eyes of fund investors.

4.2 *Impact of US sentiment on Asian local returns*

The second step in this analysis is to study how information flowed from US markets to Asian markets, using the fund price as a proxy for information (including changes in sentiment) relevant to local markets that became known during US trading hours. The daily dollar returns in the six

local markets, as well as in a “portfolio” simulating equally weighted positions all six markets, are modelled in an analogous way to the country-fund model, as follows:

$$\begin{aligned}
LR_t^i = & \beta_0 + \beta_1 FR_{t-1}^i + \beta_2 FRO_{t-1}^i + \beta_3 US_{t-1} + \\
& \beta_4 d_{t-1}^{797} + \beta_5 d_{t-1}^{797} FR_{t-1}^i + \beta_6 d_{t-1}^{797} FRO_{t-1}^i + \beta_7 d_{t-1}^{797} US_{t-1} + \\
& \beta_8 d_{t-1}^{198} + \beta_9 d_{t-1}^{198} FR_{t-1}^i + \beta_{10} d_{t-1}^{198} FRO_{t-1}^i + \beta_{11} d_{t-1}^{198} US_{t-1} + \\
& \beta_{12} d_t^{Sun,hol} + \beta_{13} LR_{t-1}^i + \varepsilon_t^i - \zeta \varepsilon_{t-1}^i
\end{aligned} \tag{3}$$

Here the variables are identical to those used in equation (1), with the addition of FRO_{t-1}^i , defined as the equally weighted average of the five daily country fund returns *excluding* that corresponding to country i . In other words,

$$FRO_t^i = \left(\frac{1}{5} \right) \sum_{j \neq i} FR_t^j . \tag{4}$$

In these regressions, the Sunday-holiday dummy equals one on days following those when the *local* market is closed. For the six-market portfolio, this dummy equals one whenever at least one local market is closed. A moving average (MA(1)) term is included in order to account for stale quotes among the index components and other factors that might induce spurious serial correlation in the error term.

Table 5 gives the results of OLS estimation of equation (3). In the first column, results are presented for the estimation of equation (3) using an equally weighted portfolio of the six local returns as the dependent variable, dropping the regional fund return variable on the right-hand side and using a portfolio of the six fund returns for FR_{t-1} . The remaining six columns present estimated coefficients for each of the six local market returns. As before, the lower two panels present the total effects during the crisis period (7/97 – 10/98) and post-crisis period (11/98–12/99), with significance levels derived from F-tests.

Before July 1997, the impact of the sentiment of fund investors on local market returns, as represented by the coefficient on FR_{t-1}^{iCC} , is positive and significant at the 5% level for four of the five crisis countries, and positive but insignificant for the remaining one, Malaysia. The magnitude of the effect ranges from 0.05 to 0.12 for the four country returns where it is significant, while the corresponding coefficient in the portfolio equation is 0.16. The returns on non-local country funds (as measured by FRO_{t-1}^i) are significant for four of the five crisis-country local markets, again with the exception of Malaysia. These effects are consistently smaller than the corresponding effect of local returns on fund returns from Table 4, as one would expect in an environment where most of the information relevant to Asian market returns is revealed during Asian trading hours.

During the crisis, the effect of FR_{t-1} increases for three of the five crisis countries and for the portfolio of returns, while the effect of FRO_{t-1} increases for four of the five. The overall impact of FR_{t-1} ranges from 0.09 to 0.47 for the three country returns where it is now significant, and reaches 0.47 for the six-country portfolio. Thus, at the same time that local returns were becoming less relevant to fund returns, the fund returns tended to become more relevant to the local returns.

The impact of the broader US market return on the local return tended to decline during the crisis. Whereas the coefficient on the US_{t-1} variable is statistically significant (at the 95% level) for four of the five local market returns in the crisis during 1990-97, during the crisis it declines and becomes insignificant for all five. For the regional portfolio, the US factor effect falls from 0.14 and significant to 0.04 and insignificant. This suggests that the increased impact of the fund returns on local markets during the crisis reflects the heightened importance of US investors'

sentiment *towards those specific markets*, and not an increased co-movement of the Asian markets with the US market in general.

After the crisis, the fund return coefficient declines for four of the five crisis countries. In fact, the fund return is significant (at the 90% level or better) and positive for only two local markets (Indonesia and Korea) in the October 1998-December 1999 period, compared with four before and three during the crisis. For the regional portfolio, the fund returns remain significant after the crisis, but their effect declines to 0.17, almost the same level as during 1990-97.

Meanwhile, the influence of the broad US market return rises again after October 1998 for all five of the crisis countries, becoming significant at the 95% level in each case. For the regional portfolio, the effect of the S&P 500 return rises from 0.04 (and insignificant) to 0.35 (and significant).

To summarise, the impact of the daily closed-end country fund return on the local return rose during the crisis, then fell afterwards, while the impact of the S&P 500 on the local return fell during the crisis and rose afterwards. This is almost directly the opposite result to what was found in section 4.1, where it was shown that the impact of the local return on the fund return fell during the crisis and rose afterward, while the impact of the S&P 500 rose during the crisis and fell afterwards.

As in the previous section, the experience of Taiwan offers an instructive counterexample. The impact of the fund and the regional returns on the local return did not change to a significant degree either during or after the crisis. The impact of the US return did not change significantly during the crisis, but fell significantly afterwards. In other words, the local market in Taiwan, unlike the Asian crisis countries, was about as sensitive to US sentiment towards that market and

to US market returns in general during the crisis as it was before the crisis, though there was some decoupling of the Taiwan market from the US after the crisis.

5. Conclusion

The results presented in this paper offer a more complex picture than does either of the caricatures which have dominated most discussions of the Asian crisis. On the one hand, it is clear that US investors (and, presumably, other investors in developed countries) did not cause the collapse of Asian financial markets by engaging in a massive sell-off of Asian securities during the 1997–98 crisis. Instead, the behaviour of closed-end fund premia suggest that US investor sentiment tended to be optimistic relative to that of Asian local investors, both during the period of the crisis and, for some countries, during its aftermath. Daily returns on Asia-oriented country funds tended to be less responsive to local market returns during the crisis, indicating that US investors were less willing to take their pricing cues from what was happening to local returns.

At the same time, the gyrations of US sentiment towards Asian markets clearly had an impact on those markets, and this impact was clearly at its strongest during the period of the crisis. During the crisis period daily fund returns had more influence on daily local market returns than previously, while local market returns had less influence on fund returns than previously. The driving factor here was the sentiment of those US investors oriented towards Asia, rather than that of the US stock market as a whole. Local Asian markets, which in non-crisis times tended to be correlated with the S&P 500 index, decoupled from the broader US market during the crisis period. These effects were weak or absent in Taiwan, which largely escaped the regional crisis.

An issue raised by these results is the relative importance of overnight effects (the impact of a day's trading in one market on the contemporaneous *close-to-open* return in the other) and consecutive spillover effects (the impact of a day's trading in one market on the subsequent *open-to-close* return in the other, analogous to the "meteor showers" discussed in the foreign exchange literature). Overnight spillovers between geographically distinct equity markets have been modelled and estimated by Lin et al (1994), while Hamao et al (1990) studied consecutive spillovers. The question would be whether spillovers of the *level* of returns from one market to the other tend to occur overnight or in the course of the following day's trading. Another path for future research would be to compare overnight transmission of the *volatility* of returns to consecutive spillovers of volatility. This might offer insights into whether the changes in relative influence between the Asian and New York markets that have been documented here represent changes to the timing of information arrival, or to changes to the behaviour of markets in their processing of new information.

Acknowledgements

We are grateful to participants in the August 2000 BIS Seminar on Market Liquidity (particularly Torben Andersson), the June 2001 European Financial Management Association conference and the December 2001 Conference on the Theories and Practices of Securities and Financial Markets in Kaohsiung and to an anonymous referee for helpful comments, and to Les Skoczylas and Marc Klau for research assistance. Any errors are our own. Any opinions expressed are also our own, and not those of the Bank for International Settlements.

References

- BIS, 1998. 68th Annual Report. Bank for International Settlements, Basel.
- BIS, 1999a. 69th Annual Report. Bank for International Settlements, Basel.
- BIS, 1999b. A Review of Financial Market Events in Autumn 1998. Bank for International Settlements, Basel.
- Bodurtha, J M, Kim, D S, and Lee, C M, 1995. Closed-End Country Funds and US Market Sentiment. *Review of Financial Studies* 8, 879-918.
- Bonser-Neal, C, Brauer, G, Neal, R, and Wheatley, S, 1990. International Investment Restrictions and Closed-End Fund Prices. *Journal of Finance* 45, 523-47.
- Bowe, Michael and Daniela Domuta, 2001. Foreign Investor Behaviour and the Asian Financial Crisis. *Journal of International Financial Markets, Institutions and Money* 11, 395-422.
- Chan, Kam C, David J Wright and Ming-Shiun Pan, 2001. Divergent Expectation and Cross Correlation in Asian Emerging Market Closed-End Country Funds. *Journal of Emerging Markets* 6, 52-59.
- Choe, H, Kho, B and Stulz, R 1999. Do Foreign Investors Destabilize Stock Markets: The Korean Experience in 1997. *Journal of Financial Economics* 54, 227-64.
- Diwan, I, Errunza, V R, and Senbet, L W, 1995. The Pricing of Country Funds from Emerging Markets: Theory and Evidence (unpublished manuscript). University of Maryland College of Business and Management.

Fischer S, 1998. The Asian Crisis: A View from the IMF. Speech at the Midwinter Conference of the Bankers' Association for Foreign Trade, Washington D.C., 22 January.

Frankel, J and Schmukler, S, 1996. Country Fund Discounts and the Mexican Crisis of December 1994: Did Local Residents Turn Pessimistic before International Investors? *Open Economies Review* 7 (Supplement 1), 511-34.

_____, 2000. Country Funds and Asymmetric Information. *International Journal of Finance and Economics* 5, 177-195.

Hamao, Y, Masulis, R W, and Ng, V, 1990. Correlations in Price Changes and Volatility across International Stock Markets. *Review of Financial Studies* 3, 281-307.

Hardouvelis, G, La Porta, R, and Wizman, T, 1994. What Moves the Discount on Country Equity Funds?. In: Frankel, J (Ed), *The Internationalization of Equity Markets*. University of Chicago Press, Chicago and London, pp 345-97.

IMF Independent Evaluation Office, 2003. *The IMF and Recent Capital Account Crises: Indonesia, Korea Brazil*. Washington, DC.

Lane, T, A Ghosh, J Hamann, S Phillips, M Schulze-Ghattas, and T Tsikata, 1999. *IMF-Supported Programs in Indonesia, Korea and Thailand: A Preliminary Assessment*. IMF Occasional Paper #178.

Kim, Chulsoo, 1999. Did Foreign Investors Destabilise the Korean Stock Market in 1999? *Singapore Economic Review* 44, 116-133.

Kramer, C, and Smith, R T, 1995. Recent Turmoil in Emerging Markets and the Behaviour of Country Fund Discounts: Renewing the Puzzle of the Pricing of Closed End Mutual Funds. IMF Working Paper #95/68.

Krugman, P, 1998. What Happened to Asia? Working Paper, MIT, downloadable at: web.mit.edu/krugman/www.

Lee, C M, Shleifer, A, and Thaler, R H, 1991. Investor Sentiment and the Closed-End Fund Puzzle. *Journal of Finance* 46, 75-109.

Lin, W-L, Engle, R F, and Ito, T, 1994. Do Bulls and Bears Move across Borders? International Transmission of Stock Returns and Volatility. *Review of Financial Studies* 7, 507-38.

Moreno, R, Pasadilla, G, and Remolona, E, 1998. Asia's Financial Crisis: Lessons and Policy Responses. In *Asia: Responding to Crisis*. Asian Development Bank Institute, Tokyo.

Pan, Ming-Shiun, Kam C Chan, and David J Wright, 2001. Divergent Expectations and the Asian Financial Crisis of 1997. *Journal of Financial Research* 24, 219-238.

Radelet, Stephen, and Jeffrey Sachs, 1998. The East Asian Financial Crisis: Diagnosis, Remedies, Prospects. *Brookings Papers on Economic Activity* 1998, no 1, pp 1-90.

Figure 1. Premium of price over net asset value: Korea, Taiwan.

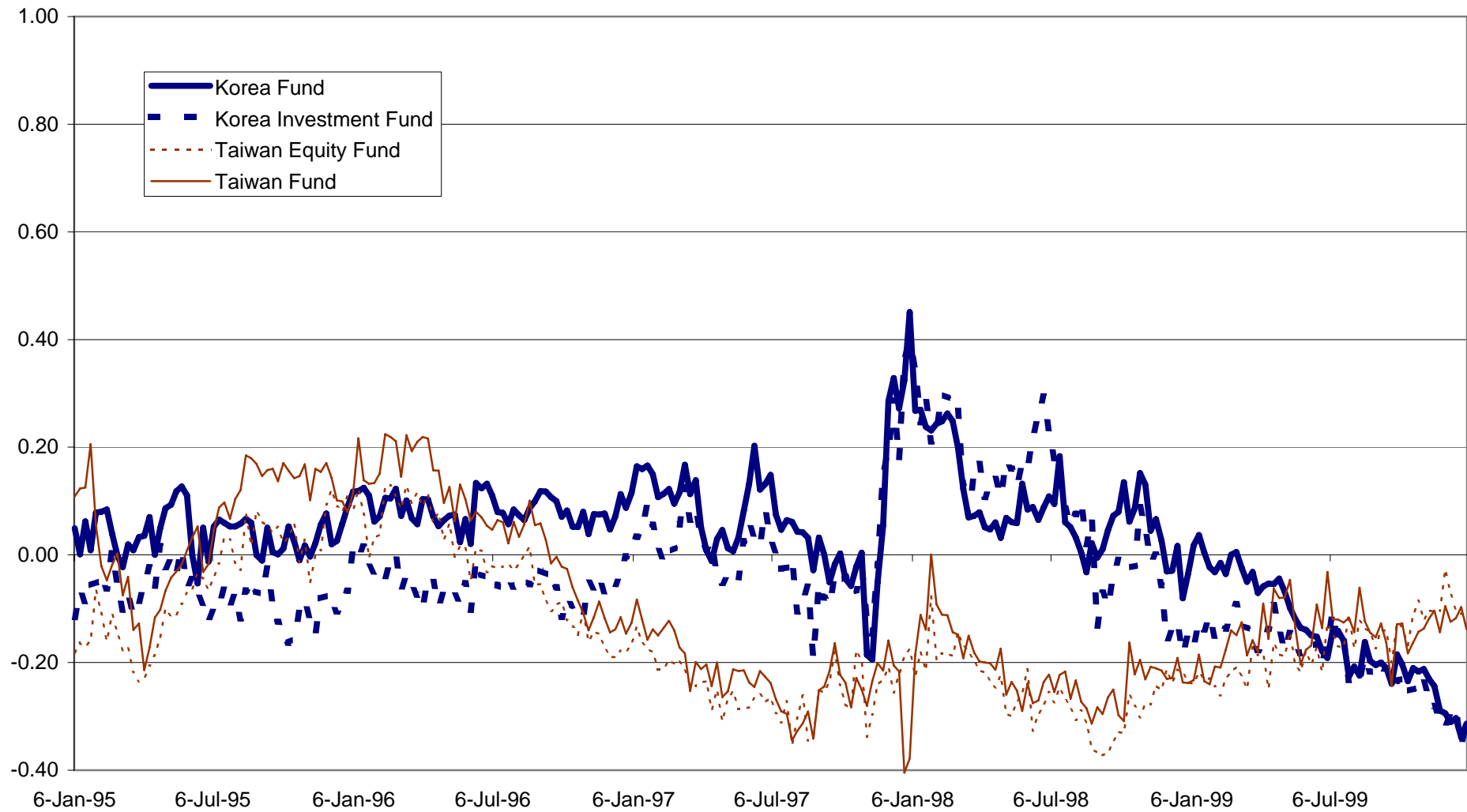


Figure 2. Premium of price over net asset value: Thailand, Malaysia.

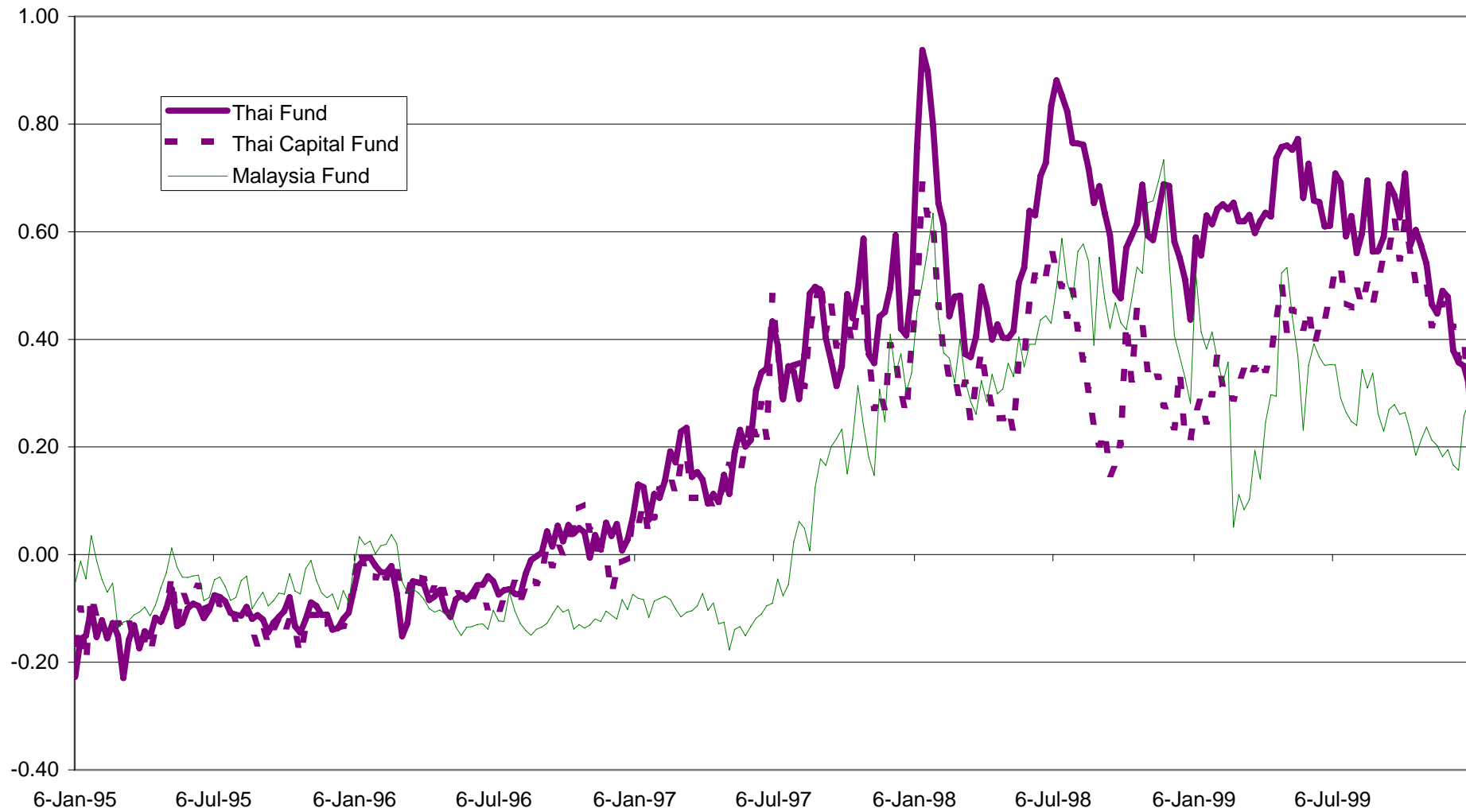


Figure 3. Premium of price over net asset value: Indonesia, Philippines

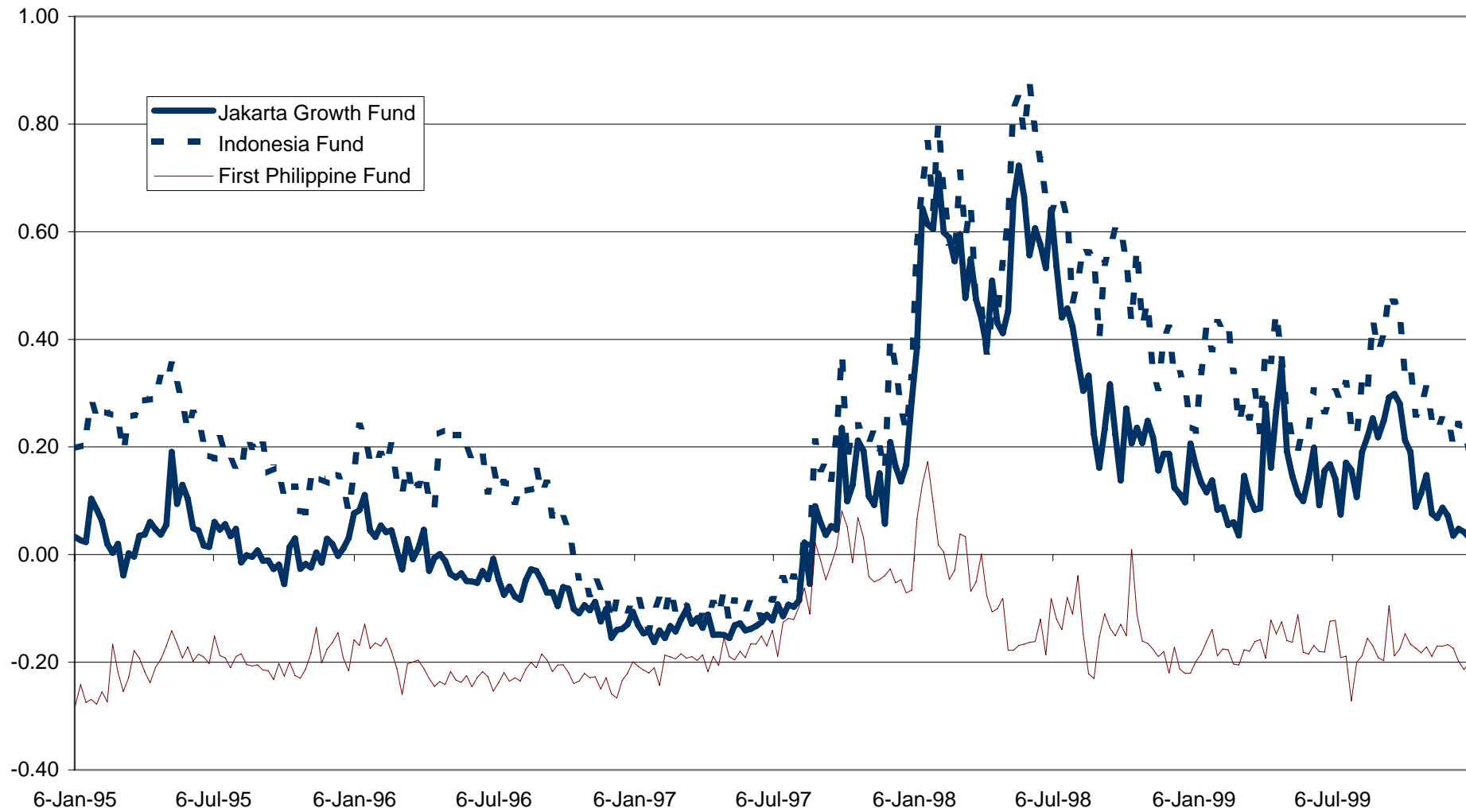


Figure Captions

(These should go at the bottom of each figure)

Figure 1:

Notes: The graph shows the difference between log closing price and log net asset value. Both are for Friday of the corresponding week.

Source: Bloomberg, author calculations.

Figure 2:

Notes: The graph shows the difference between log closing price and log net asset value. Both are for Friday of the corresponding week.

Source: Bloomberg, author calculations.

Figure 3:

Notes: The graph shows the difference between log closing price and log net asset value. Both are for Friday of the corresponding week.

Source: Bloomberg, author calculations.

Table 1

Asian closed-end country funds

Fund	Date of inception	Market capitalisation (USD millions)	Average premium 1990-1999	Premium at 12/31/99
Korea Fund	8/29/84	825	+0.12	-0.31
Korean Investment Fund	2/1/92	71	+0.01	-0.31
Thai Fund	2/1/88	97	+0.14	+0.31
Thai Capital Fund	5/1/90	NA	+0.05	+0.30
Jakarta Growth Fund	4/1/90	16	+0.09	+0.03
Indonesia Fund	3/9/90	24	+0.18	+0.19
Malaysia Fund	5/1/87	70	+0.05	+0.28
First Philippine Fund	11/1/89	56	-0.18	-0.20
Taiwan Equity Fund	7/1/94	NA	-0.14	-0.11
Taiwan Fund	12/1/86	NA	+0.01	-0.14
Average		166	+0.03	+0.00

Note: Market capitalisations are as of year-end 1999 and are not reported by the Taiwan Fund, Taiwan Equity Fund and Thai Capital Fund. The premium, measured weekly, is defined as the natural logarithm of the ratio of price to net asset value.

Sources: Bloomberg; authors' calculations.

Table 2
Correlations of fund premia

	Korean Inv't Fund	Taiwan Equity Fund	Taiwan Fund	Thai Fund	Thai Capital Fund	Jakarta Growth Fund	Indon. Fund	Malaysia Fund	First Phil. Fund
Korea Fund	0.84	0.09	0.11	– 0.26	– 0.32	0.09	0.01	– 0.16	0.19
Korean Inv't Fund		– 0.19	– 0.20	0.09	0.05	0.44	0.30	0.17	0.45
Taiwan Equity Fund			0.93	– 0.64	– 0.60	– 0.29	– 0.23	– 0.51	– 0.36
Taiwan Fund				– 0.66	– 0.66	– 0.30	– 0.22	– 0.51	– 0.38
Thai Fund					0.95	0.61	0.53	0.88	0.54
Thai Cap Fund						0.55	0.44	0.78	0.57
Jakarta Growth Fund							0.93	0.78	0.59
Indonesia Fund								0.75	0.45
Malaysia Fund									0.56

Source: Bloomberg, authors' calculations. Bold-faced figures are correlations for funds investing in the same country.

Table 3
Average premia over selected time periods

Fund	Jan 1990–Jun 1997	Jul 1997–Oct 1998	Nov 1998–Dec 1999
Indonesia Fund	0.108 (0.01)	0.410** (0.03)	0.320** (0.01)
Jakarta Growth Fund	0.032 (0.01)	0.287** (0.03)	0.151** (0.01)
Korea Fund	0.166 (0.01)	0.082** (0.01)	-0.114** (0.02)
Korean Investment Fund	0.030 (0.01)	0.077** (0.02)	-0.171** (0.01)
Thai Capital Fund	-0.068 (0.00)	0.365** (0.01)	0.405** (0.01)
Thai Fund	0.002 (0.01)	0.521** (0.02)	0.600** (0.01)
Malaysia Fund	-0.033 (0.01)	0.306** (0.02)	0.324 (0.02)
First Philippine Fund	-0.201 (0.00)	-0.076** (0.01)	-0.178** (0.00)
Taiwan Fund	0.083 (0.01)	-0.234** (0.01)	-0.154** (0.01)
Taiwan Equity Fund	-0.070 (0.01)	-0.258** (0.01)	-0.177** (0.01)
Average (all)	-0.005	+0.148	+0.101
Average (excl Taiwan)	-0.005	+0.247	+0.167
Average (Taiwan only)	+0.007	-0.246	-0.166

Standard errors in parentheses.

** - A t-test for the equivalence of means rejects equality between the fund's average premium over the period and its average premium over the immediately preceding period with 95% confidence.

Sources: Bloomberg; authors' calculations.

Table 4

Does Asian local market information drive fund prices in New York?

The first panel of this table reports selected slope coefficients and t-statistics (using Newey-West standard errors) for the following OLS regression (see text for definitions of variables):

$$FR_t^i = \beta_0 + \beta_1 LR_t^i + \beta_2 RR_t^i + \beta_3 US_t + \beta_4 d_t^{797} + \beta_5 d_t^{797} LR_t^i + \beta_6 d_t^{797} RR_t^i + \beta_7 d_t^{797} US_t + \beta_8 d_t^{1198} + \beta_9 d_t^{1198} LR_t^i + \beta_{10} d_t^{1198} RR_t^i + \beta_{11} d_t^{1198} US_t + \beta_{12} d_t^{US, Sun, hol} + \beta_{13} FR_{t-1}^i + \varepsilon_t^i - \zeta \varepsilon_{t-1}^i \quad (1)$$

In the first column, the “portfolio of funds” is an equally weighted average of the country fund returns; instead of the terms in $LR_t^{i, CC}$ and $RR_t^{i, CC}$ it is regressed on an equally weighted average of the six local market returns. Figures followed by an asterisk (*) are significant at the 10% level; those followed by a double asterisk (**) at the 5% level. The number of observations and the adjusted R^2 of each regression are also reported.

The second panel reports the totals of the coefficients on the local, regional and US returns during the period when d_t^{797} equals 1 (ie $\beta_1 + \beta_5$, $\beta_2 + \beta_6$, and $\beta_3 + \beta_7$). The third panel reports the totals for when d_t^{1198} equals 1 (ie $\beta_1 + \beta_5 + \beta_9$, etc). Significance levels are based on the F-statistic from a Wald test for the sum of the coefficients equalling zero.

Explanatory variable	Portfolio of funds	Indonesia funds	Korea fund	Malaysia fund	Philippines fund	Thailand funds	Taiwan fund
constant	-0.000 (-1.17)	-0.001 (-1.23)	0.000 (0.67)	-0.001* (-1.95)	-0.001 (-1.39)	0.000 (-0.07)	0.000 (-0.24)
d_t^{797}	-0.002 (-1.58)	-0.002 (-1.15)	-0.001 (-0.79)	-0.002 (-1.61)	-0.002 (-1.46)	-0.001 (-0.56)	-0.001 (-0.77)
d_t^{1198}	0.001 (1.11)	0.001 (0.56)	0.001 (0.56)	0.002 (0.77)	0.002 (1.19)	0.000 (0.11)	0.002 (1.21)
LR_t^i	0.831** (13.86)	0.479** (7.27)	0.546** (11.72)	0.595** (11.57)	0.456** (10.92)	0.487** (11.84)	0.546** (12.40)
$d_t^{797} LR_t^i$	-0.400** (-4.85)	-0.282** (-3.56)	-0.083 (-1.30)	-0.368** (-3.27)	-0.006 (-0.08)	-0.269** (-2.98)	0.029 (0.33)
$d_t^{1198} LR_t^i$	0.377** (3.77)	0.168** (2.34)	0.159** (2.73)	0.444** (2.49)	0.185* (1.66)	0.241** (2.30)	0.105 (1.10)
RR_t^i		0.487** (4.04)	0.335** (4.61)	0.219** (2.73)	0.365** (4.17)	0.277** (3.75)	0.291** (3.54)
$d_t^{797} RR_t^i$		-0.061 (-0.40)	-0.358** (-3.60)	0.044 (0.33)	-0.325** (-2.86)	-0.084 (-0.71)	-0.285** (-2.40)
$d_t^{1198} RR_t^i$		0.197 (0.96)	0.154 (1.54)	0.357** (2.25)	0.071 (0.67)	0.013 (0.08)	0.041 (0.31)
US_t	0.517** (10.86)	0.542** (7.05)	0.324** (4.21)	0.557** (8.11)	0.610** (8.42)	0.616** (9.94)	0.448** (5.83)
$d_t^{797} US_t$	0.518** (4.65)	0.300* (1.78)	1.000** (6.28)	0.473** (2.01)	0.473** (2.21)	0.492** (2.27)	0.259** (2.39)
$d_t^{1198} US_t$	-0.490** (-3.97)	-0.071 (-0.33)	-0.681** (-4.17)	-0.490* (-1.75)	-0.751** (-3.34)	-0.547** (-2.18)	-0.300** (-2.14)

Explanatory variable	Portfolio of funds	Indonesia funds	Korea fund	Malaysia fund	Philippines fund	Thailand funds	Taiwan fund
$d_t^{\text{US sun, hol}}$	-0.000 (-0.67)	0.000 (0.22)	-0.002** (-2.24)	0.002 (1.29)	0.001 (0.81)	-0.002 (-1.61)	-0.002 (-1.50)
FR_{t-1}^i	-0.054 (-1.45)	-0.074 (-1.23)	-0.148** (-2.83)	0.003 (0.06)	-0.033 (-0.46)	0.017 (0.39)	0.066 (1.38)
ζ	0.059 (1.45)	-0.006 (-0.09)	0.048 (0.78)	-0.059 (-1.17)	-0.135** (-2.16)	0.002 (0.04)	-0.140** (-2.83)
N	2060	2060	2060	2060	2060	2060	2060
Adj R ²	0.45	0.24	0.35	0.26	0.28	0.29	0.22
Effects during 7/97–10/98:							
LR_t^i	0.431**	0.198**	0.463**	0.227**	0.450**	0.218**	0.575**
RR_t^i		0.426**	-0.023	0.262**	0.040	0.193**	0.005
US_t	1.035**	0.841**	1.324**	1.030**	1.083**	1.108**	0.706**
Effects during 11/98–12/99:							
LR_t^i	0.808**	0.365**	0.622**	0.671**	0.635**	0.459**	0.680**
RR_t^i		0.623**	0.131*	0.619**	0.111	0.206	0.046
US_t	0.545**	0.771**	0.643**	0.540**	0.332**	0.562**	0.407**

Table 5

Does New York market information drive Asian local returns?

The first panel of this table reports selected slope coefficients and t-statistics (using Newey-West standard errors) for the following OLS regression (see text for definitions of variables):

$$\begin{aligned}
 LR_t^i = & \beta_0 + \beta_1 FR_{t-1}^i + \beta_2 FRO_{t-1}^i + \beta_3 US_{t-1} + \\
 & \beta_4 d_{t-1}^{797} + \beta_5 d_{t-1}^{797} FR_{t-1}^i + \beta_6 d_{t-1}^{797} FRO_{t-1}^i + \beta_7 d_{t-1}^{797} US_{t-1} + \\
 & \beta_8 d_{t-1}^{1198} + \beta_9 d_{t-1}^{1198} FR_{t-1}^i + \beta_{10} d_{t-1}^{1198} FRO_{t-1}^i + \beta_{11} d_{t-1}^{1198} US_{t-1} + \\
 & \beta_{12} d_t^{i \text{ Sun, hol}} + \beta_{13} LR_{t-1}^i + \varepsilon_t^i - \zeta \varepsilon_{t-1}^i
 \end{aligned} \tag{3}$$

In the first column, the “portfolio of returns” is an equally weighted average of the local index returns; instead of the terms in $FR_t^{i \text{ CC}}$ and $FRO_t^{i \text{ CC}}$, it is regressed on an equally weighted average of the six country fund returns. Figures followed by an asterisk (*) are significant at the 10% level; those followed by a double asterisk (**) at the 5% level. The number of observations and the adjusted R^2 of each regression are also reported.

The second panel reports the totals of the coefficients on the local fund, regional fund and US market returns during the period when d_t^{797} equals 1 (ie $\beta_1 + \beta_5$, $\beta_2 + \beta_6$, and $\beta_3 + \beta_7$). The third panel reports the totals for when d_t^{1198} equals 1 (ie $\beta_1 + \beta_5 + \beta_9$, etc). Significance levels are based on the F-statistic from a Wald test for the sum of the coefficients equalling zero.

Explanatory variable	Portfolio of returns	Indonesia local return	Korea local return	Malaysia local return	Philippines local return	Thailand local return	Taiwan local return
constant	0.001** (2.75)	0.001 (1.42)	0.000 (-1.19)	0.001 (1.48)	0.001 (1.56)	0.000 (0.80)	0.000 (-0.13)
d_{t-1}^{797}	-0.002 (-1.55)	-0.005 (-1.46)	-0.001 (-0.74)	-0.004 (-1.46)	-0.001 (-0.93)	0.000 (0.06)	-0.001 (-0.96)
d_{t-1}^{1198}	0.003* (1.95)	0.007 (1.60)	0.004 (1.61)	0.005* (1.91)	0.001 (0.48)	0.001 (0.36)	0.001 (1.03)
FR_{t-1}^i	0.161** (6.51)	0.055** (2.80)	0.045** (2.11)	0.046 (1.46)	0.072** (2.38)	0.123** (3.41)	0.074** (2.86)
$d_{t-1}^{797} FR_{t-1}^i$	0.306** (3.27)	0.134 (1.33)	0.426** (3.45)	-0.072 (-0.75)	0.017 (0.33)	-0.013 (-0.15)	0.009 (0.22)
$d_{t-1}^{1198} FR_{t-1}^i$	-0.301** (-3.05)	-0.077 (-0.66)	-0.301** (-2.37)	0.021 (0.21)	-0.031 (-0.46)	-0.090 (-0.73)	-0.033 (-0.54)
FRO_{t-1}^i		0.137** (5.44)	0.072** (2.59)	0.078 (1.63)	0.155** (3.84)	0.198** (4.71)	0.127** (2.75)
$d_{t-1}^{797} FRO_{t-1}^i$		0.263 (1.15)	-0.077 (-0.77)	0.291* (1.91)	0.280** (2.86)	0.370** (2.61)	-0.089 (-1.50)
$d_{t-1}^{1198} FRO_{t-1}^i$		-0.385 (-1.41)	-0.076 (-0.66)	-0.339** (-2.08)	-0.239** (-2.16)	-0.341** (-2.05)	0.065 (1.10)
US_{t-1}	0.135** (4.78)	0.116** (2.99)	0.068 (1.37)	0.273** (5.56)	0.208** (3.64)	0.274** (3.60)	0.325** (3.35)
$d_{t-1}^{797} US_{t-1}$	-0.091 (-0.67)	-0.092 (-0.26)	-0.243 (-0.89)	-0.192 (-0.84)	-0.148 (-0.80)	-0.523** (-2.40)	-0.007 (-0.05)
$d_{t-1}^{1198} US_{t-1}$	0.304**	0.549	0.680**	0.214	0.281	0.600**	-0.265*

Explanatory variable	Portfolio of returns	Indonesia local return	Korea local return	Malaysia local return	Philippines local return	Thailand local return	Taiwan local return
	(2.03)	(1.36)	(2.34)	(0.87)	(1.45)	(2.45)	(-1.88)
$d_t^{i \text{ sun, hol}}$	-0.001** (-2.32)	0.000 (-0.30)	0.001 (0.92)	-0.001 (-1.16)	-0.001 (-0.62)	-0.004** (-3.47)	0.000 (0.06)
LR_{t-1}^i	0.030 (0.43)	0.008 (0.06)	0.232** (1.99)	-0.002 (-0.01)	0.069 (0.89)	-0.079 (-1.17)	0.334** (3.03)
ζ	0.107 (1.24)	0.007 (0.04)	-0.235* (-1.74)	0.013 (0.08)	-0.007 (-0.08)	0.119* (1.65)	-0.361** (-3.34)
N	2059	1990	2354	2370	2036	2355	2321
Adj R²	0.25	0.08	0.12	0.05	0.15	0.14	0.05

Effects during 7/97–10/98:

FR_{t-1}^i	0.467**	0.189*	0.472**	-0.026	0.089**	0.110	0.083**
FRO_{t-1}^i		0.400*	-0.005	0.369**	0.435**	0.568**	0.038
US_{t-1}	0.044	0.023	-0.175	0.081	0.060	-0.249	0.318**

Effects during 11/98–12/99:

FR_{t-1}^i	0.166**	0.112*	0.170**	-0.005	0.058	0.020	0.050
FRO_{t-1}^i		0.015	-0.081	0.030	0.196**	0.227**	0.103**
US_{t-1}	0.349**	0.572**	0.505**	0.295**	0.341**	0.352**	0.053