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

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Abstract

A salient feature of the Asian crisis of 1997 was a collapse of stock markets that took place over several months. The dynamics of this collapse raises the question of what information was driving the markets. This paper examines a key aspect of this question: did information flow from the domestic Asian markets to overseas markets, or vice versa? We test for the direction of this information flow by comparing daily returns in several Southeast Asian equity markets with daily returns on US-based closed-end funds that invest in those markets, exploiting the fact that there is no overlap between the trading hours in the two regions. We find that while information flows between local and US markets tended to be roughly evenly balanced *before* the crisis, US market returns assumed a more important role *during* the crisis. This is the case both for the level of daily returns and for the volatility of those returns. We also find that fund returns were more closely tied to broad US market returns during the crisis period. This suggests that the shift in causation between the United States and Asia reflected a greater role for US market sentiment, rather than for the news that became known during US trading hours.

I. 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? Proponents of the former view have pointed to poor policy choices in the emerging economies, particularly in such areas as exchange-rate policy, banking supervision and corporate governance. Adherents of the latter view emphasise the suddenness and magnitude of the reversal in capital flows to the emerging economies, and the fact that markets seemed to "punish" geographically similar but otherwise sound economies with high credit-risk premia and reduced capital-market access. This debate over events in the recent past is of relevance to a number of current policy issues, including the appropriateness of restrictions on international capital flows, the role of the International Monetary Fund, and the "bailing in" of private sector lenders in sovereign debt workouts.

The two positions are not necessarily mutually exclusive. Some commentators concede that the crisis economies were flawed, but assert that global investors overreacted to their difficulties. Martin Wolf (1998) comments that whatever the policy crimes, these "hardly justify the enormity of the punishment."[1] Fischer (1998), by contrast, characterises the countries' problems as "mostly homegrown" and points to a number of common policy faults - specifically macroeconomic overheating, pegged exchange rates, and weak bank supervision - though he also acknowledges significant differences among the countries.[2] Paul Krugman explains the severity and spread of the crisis by likening it to a bank run.[3] The issue then becomes: Who ran? Some analysts have argued that capital outflows represented a self-fulfilling "rush for the exits" by panicked foreign investors, while others claim the outflows were initiated by massive capital flight by "front-running" domestic investors.

This paper does not offer a conclusive resolution to this debate. It does, however, attempt to provide an insight into a key aspect of it, namely: in the period surrounding the crisis, did information about financial market returns in emerging economies flow from the domestic market to overseas markets, or vice versa? In this study, "information" is defined broadly to include anything that might have a material effect on returns, including changes in investor sentiment.

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1 Wolf, M, "Flows and Blows," *Financial Times*, 3 March 1998.

2 Fischer, S, "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 1998.

3 Krugman, P, "Paradigms of Panic: Asia Goes Back to the Future," *Slate Magazine*, 12 March 1998.

We test for the flow of information by comparing daily returns in several east Asian equity markets with daily returns on US-based closed-end funds that invest in those markets. Because there is essentially no overlap between the trading hours in the two regions, 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 closed-end funds in the United States 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. Completing the picture of information flows, the populations of investors in the two markets are likely to differ as well. Indeed, a primary function of closed-end funds is to allow investors in mature markets to gain exposure to the corresponding emerging markets, without requiring them to trade directly in those markets. This distinction might be less useful, however, to the extent that foreign investors are active in local Asian markets.

Previous studies of country fund behaviour, such as Frankel and Schmukler (1996) and Bodurtha, Kim and Lee (1995), compare fund prices to their net asset values (NAVs). Bodurtha, Kim and Lee find that that movements in the premia of fund prices over their NAVs are highly correlated and reflect US stock market returns, implying an important role for US investor sentiment in fund returns. Frankel and Schmukler examine prices and NAVs on three closed-end funds investing in Mexico around the December 1994 peso crisis in an attempt to gauge the relative levels of sentiment of local and foreign investors. They find that the funds tended to trade at a discount before the crisis and at a premium afterwards, suggesting that foreign investors were relatively more optimistic than their local counterparts. They further note that NAV returns tended to "cause" price returns in a Granger sense, further supporting the view that the drop in confidence during the crisis had strong local roots.

We examine this relationship below, but we also compare fund returns to local market returns, for two reasons. First, NAVs are available only at a weekly frequency while local returns are available daily, allowing a finer analysis of price behaviour. Second, the time difference between the two markets allows us to study timing issues, rather than simple correlations.

Evidence on the timing of securities returns on essentially identical securities in different markets - ie on whether price movements in one market tend to lead or lag price movements in the other - could be informative either about the timing of the arrival of relevant news, 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 relevant news becomes known during Asian trading hours. Exceptions might be official statements or policy decisions (such as IMF program announcements) by institutions located in the United States and Europe. Significant changes of sentiment, on the other hand, could conceivably occur among either group of investors. A finding that returns in closed-end funds led returns in local markets would thus be evidence for the importance of mature-market investor sentiment in determining emerging-market returns. A finding that returns in local markets led those in closed-end funds, on the other hand, would be less conclusive. While such a finding could indicate an important role for local sentiment, returns could simply be reacting to local news.

We find that information flows between local and US markets tended to be roughly evenly balanced before the "crisis period" beginning in July 1997, but that US market returns assumed a relatively more important role during the crisis. This is the case both for the level of daily returns and for the volatility of those returns. We also find that the funds are more reflective of the broad US market return during the crisis period. This suggests that the shift in causation between the United States and Asia reflected a greater role for US market sentiment, rather than for the news that became known during US trading hours.

Corroborating evidence is provided by the behaviour of US purchasers of Asian equities. Using aggregated data provided by a large securities custodian, we find that the positive influence of local-market returns on fund returns tends to be weaker at times when US investors purchased large amount of Asian equities. In other words, large equity flows to Asia are associated with looser price links between markets, while flows out of Asia are associated with stronger price links. This suggests that US investors tend to be contrarians in their portfolio activities vis-à-vis Asia: they purchase Asian equities just at those times when their opinions differ most strongly from those in the local markets.

To some extent these results can be counted as evidence against the "front-running" hypothesis tested by Kramer and Smith (1995) and Frankel and Shmukler (1996). While we do find, as Frankel and Shmukler do for Mexico, that the funds' prices move from a discount to NAV to a premium after the crisis started, we do not find that sentiment among Asian investors drives changes in sentiment among US investors. Instead, our results are closer to those of Choe, Kho and Stulz (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.

The next section reviews the debate about the direction of information flows before, during and after the Asian crisis. Section III examines characteristics of closed-end funds, including country funds, and discusses how they might shed light on the information-flow debate. Section IV describes the funds and local returns used in this study and discusses the behaviour of the discount to NAV over the period studied. Section V presents results on spillovers of the level and volatility of returns before, during and after the crisis, while Section VI examines return and volatility spillovers during times of investor inflows and outflows. Section VII concludes.

II. Information flows and the Asian crisis

The second half of 1997 saw the unprecedented collapse of the stock markets and currencies of five Asian countries - Thailand, Indonesia, Malaysia, the Philippines and South Korea. By year's end, the five Asian currencies had shed a third to three quarters of their values. The stock markets of Bangkok, Jakarta, Kuala Lumpur, and Manila had lost USD 370 billion or 63% of the four countries' combined GDP. The Seoul stock market had declined 60%. The debacle effectively ended years of impressive economic performance by these countries.

The first sparks of the Asian crisis may have started in Thailand in March 1997 when loan problems of several finance companies came to light.[4] The Bangkok stock market fell 25% over the next three months and the Thai baht came under increasing pressure. When the Thai authorities devalued the baht in July, the crisis quickly became a regional one, spreading to Indonesia, Malaysia, and the Philippines (Figs. 1 and 2). In October, the Korean won and the Seoul stock market joined the carnage after credit rating agencies downgraded several of the country's banks. In the region, Taiwan stood out as a country that has escaped the crisis virtually unscathed.

The relatively benign macroeconomic conditions of the Asian countries and their somewhat different circumstances make the severity and spread of the crisis a puzzle. Prime Minister Mahathir of Malaysia blames such a run on "highwaymen of the global economy," hedge fund managers in particular.[5] Brown, Goetzmann, and Park (1998), however, estimate the currency positions of ten large hedge funds and find nothing unusual about these funds' net positions or profits during the crash period. If these authors are right, a key issue that remains is whether blame can be placed on other classes of foreign investors.

Certainly a sharp overall decline in net inflows of foreign capital to the crisis countries accompanied the collapse in currency values and stock prices, whether as cause or effect (Table 1). Portfolio investment fell much more sharply than did foreign direct investment in most countries, although the degree and timing of this decline varied. Banking flows, in particular, reversed dramatically from the second half of 1997 onwards (Graph 1).

The behaviour of equity investors is more ambiguous. Data assembled by State Street, a large international securities custodian, indicate that foreign investors often tended to increase their purchases of domestic equities precisely at those times when foreign banks were reducing their exposures (Graph 2). However, in the case of Indonesia, foreign equity sales reinforced cutbacks in bank lending. These data are discussed in more detail in part VII below.

Clearly it is problematic to determine the impact on the crisis countries of "foreigners" as a group, given the divergent response to the crisis shown by different groups of investors. The remainder of this paper is focused on the behaviour of one important group of foreign investors, namely participants in the market for closed-end funds that hold Asian equities. To the extent that these investors are representative of foreign equity investors in Asia as a whole, the analysis can shed light on an important aspect of the questions identified in the Introduction. Foreign equity investors as a group certainly play an important role in local markets in Asia; for example, in the Korean stock market, foreign investors held 12% at 2 December 1996 and 14.73% at 27 December 1997 (Choe, Kho and

[4] See Moreno, Pasadilla, and Remolona (1998) for a narrative of the crisis. They also offer an explanation based on Krugman (1998) and McKinnon and Pill (1998).

[5] Mahathir, M, "Highwaymen of the Global Economy," *Wall Street Journal*, 23 September 1997.

Stulz, 1999). However, answers to the broader question of the role of foreign investors in the Asian crisis await a detailed study of the role of banks, hedge funds and other investor classes.

III. Closed-end funds

A closed-end fund is an investment vehicle that has a fixed number of shares and invests in a portfolio of stocks, bonds, and other securities, usually with a specialised focus. Closed-end country funds hold portfolios consisting of shares in firms based in a specific country or group of countries.

After its initial offering, new investors can obtain shares in the fund only by purchasing them from other investors. The market price of the fund and the net asset value (NAV) of its holdings tend to differ, because of the difficulty of engaging in arbitrage between fund shares and the shares in the fund's portfolio. In particular, it is difficult to take short positions in most closed-end funds because they are not actively traded. For funds that hold stocks traded in the US domestic market, the price tends to be below the NAV, while US-based funds that specialise in stocks from foreign countries can trade at both large premiums and large discounts (Bodurtha, Kim and Lee, 1995; Bonser-Neal et al, 1990). Funds can be terminated in two ways, either by a change in the fund's structure to that of an open-ended fund or by liquidation, both of which result in the value of the shares equalling that of the fund's NAV. The uncertainty as to the final termination date is another factor hindering arbitrage between the fund's price and its NAV. In other words, funds which trade at a discount to their NAV can be thought of as promising a positive excess return, relative to the underlying assets, over an uncertain horizon.

Explanations for the presence of this implied excess return vary. A traditional view emphasises agency costs: "Because the managers of closed-end funds are perceived to be less responsive to profit opportunities than open-end fund managers, who must attract and retain shareholders, closed-end fund shares often sell at a discount from net asset value" (Downes and Goodman, 1991). More recent analysts, including Lee, Shleifer and Thaler (1991), note that a fund and its component stocks are likely to be held by different clienteles of investors. Specifically, Lee, Shleifer and Thaler find that the funds in their sample tend to be held disproportionately by individual rather than institutional investors. Given the difficulty of arbitrage, the fund price and the NAV can therefore reflect differences in "sentiment" across these clienteles, and indeed the difference between them can act as an index of small-investor sentiment relative to that of the rest of the market. Lee, Shleifer and Thaler further propose that the tendency for closed-end funds to trade at prices below their NAV, that is to offer positive excess returns, compensates for the risk of liquidity-related selling or large swings in sentiment on the part of individual investors.

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 any effects resulting from 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 these barriers 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 these announcements reduce 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 while restrictions on flows drive them apart. Instead, it indicates that investors in country funds are willing to accept relatively lower returns 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.

IV. The behaviour of premia

For the present study, closed-end funds are identified that represent each of the 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 controls, we also include two funds for Taiwan, which is considered to have been relatively less affected by the crisis than the other five. This produces a sample of ten funds from six countries (Table 2).

Six of the ten funds sold at prices that were, on average, at a positive premium to their NAVs during 1995-99, of which five were still at a premium on the last day of 1999. For each of the ten 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 the countries for which two funds are observed, suggesting that investor sentiment specific the country concerned, rather than factors unique to specific funds such as the perceived abilities of the fund managers, tended to be the key factor moving the premia (Table 3).[6] Correlations of premia for funds from different countries are not especially high. The figures in the bottom five lines in each panel in Table 3, 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 Korea and Taiwan premia were with each other.

While there is no persistent pattern as to whether the funds tended to trade at a premium or a discount, their behaviour before, during and after the crisis illustrates the evolution in investor sentiment towards the region (Graph 3). Premia rose for all of the funds from the crisis countries starting in mid-1997. 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, while the two Taiwan funds continued to exhibit discounts. 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.

It will be useful to define the period from 1 July 1997 to 31 October 1998 as the "crisis era". 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.[7]

Average premia during this crisis period were higher than those for the previous two and a half years (1 January 1995-30 June 1997) for eight of the ten funds studied (Table 4). While during the pre-crisis period, six of these eight sold at a discount to NAV, during the crisis all but one sold at a premium. The two cases where premia declined (that is, discounts were larger) are the two Taiwan funds. In every case, the crisis-period average premium is significantly different from that of the pre-crisis period according to the standard t-test.

Average premia in the fourteen months following October 1998 were lower than during the crisis period for the Korea, Indonesia, and Philippines funds. The premium on the Malaysian Fund fell, but to an insignificant degree, despite the country's economic recovery. This may reflect Malaysia's imposition of controls on foreign exchange and portfolio flows from September 1998, thus confirming the results of Bonser-Neal et al. For Thailand, premia continued to rise after the crisis. For Taiwan, the discounts narrowed again after the crisis, while remaining larger than pre-crisis levels.

These observations generally correspond to Frankel and Schmukler's findings for Mexico, and 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, these shifts were reversed for Korea, the Philippines, and Indonesia, but not for Thailand or Malaysia. For Taiwan, the discount widened during the crisis and then narrowed afterwards. Taken in isolation, this might seem to be a sign of contagion: US investors turned bearish on Taiwan because of the region's problems, while local investors remained calm. In conjunction with the results for the other five countries, however, where the shifts in sentiment moved in the opposite direction, the contagion interpretation seems less convincing. Rather than a divergence in sentiment about the valuation of the Taiwanese market, the wider discount for Taiwan may instead have indicated an increase in the risk premium demanded by US investors for Taiwanese assets.

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[6] 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 the difference between price and net asset value, even when the price is below the NAV (in which case the term "discount" will occasionally be used as well).

[7] 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 BIS (1998, 1999a, 1999b).

V. Tracking the direction of influence: daily price changes

Fund premia offer an indication of the relative levels of sentiment of US and Asian investors, but they cannot tell us whether and in what ways the attitudes of these two groups of investors influence one another. In this section, we attempt to answer these questions by examining daily price changes in the two regions, relying on the fact that the two markets are open at different times.

V.1 Impact of Asian local returns on US country funds

Daily prices of closed-end funds are modeled according to the following GARCH(1,1) specification:

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\begin{aligned}
FR_t^i &= \alpha_0 + \alpha_1 LR_t^i + \alpha_2 RR_t^i + \alpha_3 US_t + \alpha_4 FR_{t-1}^i \\
&\quad + \alpha_5 d_t^{797} + \alpha_6 d_t^{797} LR_t^{\,i} + \alpha_7 d_t^{797} RR_t^i + \alpha_8 d_t^{797} US_t + \alpha_9 d_t^{797} FR_{t-1}^i \\
&\quad + \alpha_{10} d_t^{1198} + \alpha_{11} d_t^{1198} LR_t^{\,i} + \alpha_{12} d_t^{1198} RR_t^i + \alpha_{13} d_t^{1198} US_t + \alpha_{14} d_t^{1198} FR_{t-1}^i \\
&\quad + \alpha_{15} LR_t^{i\,2} + \varepsilon_t^i \\
\varepsilon_t^i &\sim N(0, h_t^i) \\
h_t^i &= \gamma_0 + \gamma_1 \varepsilon_t^{i\,2} + \gamma_2 h_{t-1}^i + \gamma_3 d_t^{797} + \gamma_4 d_t^{1198} + \gamma_5 LR_t^{i\,2} + \gamma_6 d_t^{797} LR_t^{i\,2} + \gamma_7 d_t^{1198} LR_t^{i\,2}
\end{aligned}
\tag{1}
$$

where *i* indexes funds and countries and the variables are defined as follows:

FR_t^i: The daily log change in the closing price of the fund. Where two funds are available for a given country, the average of the two daily returns is used.

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.[8] The indices used are listed in Table 5. Asian-close exchange rates were used to translate the local currency returns into dollar returns.

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*.

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

d_t^{797}: A dummy variable taking the value one from 1 July 1997 through the end of the sample.

d_t^{1198}: A dummy variable taking the value one from 1 November 1998 through the end of the sample.

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, Errunza and Senbet (1995) and Bodurtha, Kim and Lee (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 not fully incorporated) into the local market.

- We include the lagged fund return to correct for autocorrelation, which was found to be present in many of the fund returns. To the extent that local-market returns reflect the previous day's country-fund returns (as will be discussed below), we want to eliminate the

[8] 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.

impact of autocorrelation in the country-fund returns as much as possible and focus on what "new" is learned from the day's local-market returns.

- Using two dummy variables, d_t^{797} and d_t^{1198}, lets us ask not only whether price behaviour differs during the crisis period, but also whether markets returned to their previous behaviour in its aftermath.
- The estimated returns are characterised by autoregressive conditional heteroskedasticity. This reflects the findings of ARCH-LM tests (results of which are available from the authors). A further discussion of the GARCH specification and the estimated coefficients for the volatility equation can be found in Section VI.
- There is a risk that the volatility equation will pick up a non-linear relationship between local and fund returns, rather than a pure volatility linkage. For this reason, $LR_t^{i\,2}$ is included on the right-hand side of the mean equation. The estimated coefficients (not reported here) are significant in a few cases, and positive in nearly all cases, suggesting that a non-linear, convex relationship probably does exist.

The first panel of Table 6 presents results of the estimation of equation (1) by OLS for the fund returns for the six countries in our sample. The second and third panels of Table 6 respectively report the sums of the coefficients on the local, regional and US return variables during the crisis (7/97-10/98) and afterwards (11/98-12/99) for each equation. The first column of Table 6 reports the results from an estimation of equation (1) using the average of the six fund returns as the dependent variable, the average of the six regional returns as RR_t^i, and dropping the right-hand terms in LR_t^i. Graph 4 shows the coefficients on the local and US market returns in the three periods for the six-country portfolio and the individual countries.

During all three periods studied, both the local return and the US market return are positive and significant (at the 10% significant level) for each fund, confirming the findings of Diwan, Errunza and Senbet (1995) and others. The regional return, reflecting overall investor sentiment in Asia, is significant for all six individual country returns and for the portfolio of funds before July 1997, but has a less consistent impact thereafter for some countries. The adjusted R^2 terms indicate that our four factors (the three shown and the lagged fund return) and two dummies explain between 26 and 49% of fund returns over the sample period.

Before July 1997, a remarkably consistent fraction - between 0.49 and 0.59 - of each country's daily local return is reflected in corresponding closed-end fund returns. US market sentiment is also an important factor for country closed-end funds, with a factor loading ranging from 0.15 to 0.50.

During the Asia crisis, the local return tends to become less important, and the US market return more important. For Korea, Thailand, Indonesia, Malaysia and the Philippines the coefficient on the local return factor falls by an amount between 0.11 and 0.35, while remaining significant. Only for Taiwan, which as noted was relatively unharmed by the crisis, does the effect of the local-return factor rise, though insignificantly. At the same time, the weight of the US market return rises sharply for all six countries, by amounts ranging from 0.38 to 0.72. The weight of the regional factor falls for three of the six countries, becoming insignificant for two of them. The greatest decline in the regional factor is for Taiwan, indicating that during the crisis investors reduced the importance they assigned to regional developments in their day-to-day valuations of the Taiwanese equity market.

For the portfolio of funds, the average local return has a factor weight more than double that of the US market returns before July 1997, with coefficients of 0.76 and 0.34 respectively. During the crisis, both factors are still significant, but their relative weights shift sharply: to 0.51 for the regional average and 0.78 for the S&P 500. This conforms to the picture offered by the individual country returns: 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, the balance again shifts back to a greater role for the local returns, though the role of the US market factor remains strong. For the six-country portfolio, the local weight rises to 0.75 while the weight on the S&P 500 falls to 0.54. For the six individual-country fund returns, the US factor weight falls in every case, but for five of them (the Philippines is the exception) it stays above its pre-crisis level. The coefficient on the local return rises for all six countries: for four of them, paradoxically, to a level greater than that prevailing before July 1997. It is notable that the two countries, Thailand and Indonesia, where the local return coefficient does not return to its pre-July 1997 level, 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

US and local investors in Asia, a divergence that diminished sharply in the aftermath of the crisis for the other four countries studied.

V.2 Impact of US sentiment on Asian local returns

Asian local returns can be modeled in a similar way to the US fund returns in the previous section, by modifying equation (1) as follows:

$$\begin{aligned} LR_t^i &= \beta_0 + \beta_1 FR_{t-1}^i + \beta_2 FRO_{t-1}^i + \beta_3 US_{t-1} + \beta_4 LR_{t-1}^i \\ &\quad + \beta_5 d_{t-1}^{797} + \beta_6 d_{t-1}^{797} FR_{t-1}^{\ i} + \beta_7 d_{t-1}^{797} FRO_{t-1}^i + \beta_8 d_{t-1}^{797} US_{t-1} + \beta_9 d_{t-1}^{797} LR_{t-1}^i \\ &\quad + \beta_{10} d_{t-1}^{1198} + \beta_{11} d_{t-1}^{1198} FR_{t-1}^{\ i} + \beta_{12} d_{t-1}^{1198} FRO_{t-1}^i + \beta_{13} d_{t-1}^{1198} US_{t-1} \\ &\quad + \beta_{14} d_{t-1}^{1198} LR_{t-1}^i + \beta_{15} FR_{t-1}^{i\ 2} + \eta_t^i \\ \eta_t^i &\sim N(0, k_t^i) \\ k_t^i &= \delta_0 + \delta_1 \eta_t^{i\ 2} + \delta_2 k_{t-1}^i + \delta_3 d_{t-1}^{797} + \delta_4 d_{t-1}^{1198} + \delta_5 FR_{t-1}^{i\ 2} + \delta_6 d_{t-1}^{797} FR_{t-1}^{i\ 2} + \delta_7 d_{t-1}^{1198} FR_{t-1}^{i\ 2} \end{aligned} \tag{2}$$

In addition to the terms in equation (1), this equation includes FRO_{t-1}^i, the equally weighted average of the five local returns excluding *i*.

Note that equations (1) and (2), while having several terms in common, do not raise simultaneity issues. The dependent variable in equation (2), LR_t^i, is an independent variable in equation (1), but the dependent variable in equation (1), FR_t^i, is only represented in equation (2) in the form of its lag - which is on the right-hand side of equation (1) as well. Thus, while the inclusion of both the dependent and several of the independent variables from equation (2) on the right-hand side of equation (1) may raise multicollinearity issues, we need not worry about the independence of the disturbance terms in either equation.

Table 7 gives the results of the estimation of equation (2) for each of the six local returns. In the first column, results are presented for the estimation of equation (2) using an equally weighted portfolio of the six local returns as the independent 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}. As before, the lower two panels presents the coefficients for the crisis period (7/97-10/98) and post-crisis period (11/98-12/99), with significance levels derived from F-tests. Graph 5 illustrates the coefficients on the fund returns and the S&P 500.

Before July 1997, the sentiment of fund investors, as represented by the coefficient on the previous day's fund return, is significant at the 10% level for three of the six countries. The magnitude of the effect ranges from 0.08 to 0.13 for the three country returns where it is significant to 0.19 (but not statistically significant) for the portfolio. These effects are consistently smaller than the corresponding effect of local returns on fund returns from Table 6, as one would expect in an environment where most of the news relevant to Asian market returns occurs during Asian trading hours.

During the Asian crisis, this effect increases significantly for two countries (Korea and Indonesia) and for the local return, increases to an insignificant degree for three countries, and falls slightly and insignificantly for Malaysia. It ranges from 0.15 to 0.28 for the four country returns where it is now significant, and reaches 0.45 (and statistically significant) 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.

In contrast to the increased effect of US closed-fund returns on local markets, the impact of the broader US market return tended to decline during the crisis. Whereas the coefficient on the US_{t-1} variable is statistically significant (at the 10% level) for four of the six country returns, during the crisis it declines for four countries and remains significant for only two. For the regional portfolio, the US factor coefficient falls from 0.17 to 0.12. 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 merely an increased co-movement of the Asian markets with the US market in general.

After the crisis, the fund-return coefficient tends to fall again. In fact, the fund return is significant and positive for only one local market (the Philippines), compared with three before and four during the crisis; it turns significant and *negative* for Malaysia. For the regional portfolio, the fund-return coefficient remains significant after the crisis, but declines to 0.13.

Meanwhile, the influence of the broad US market return again rises after October 1998 for four of the six countries. It becomes significant at the 5% level for five of them - all except Taiwan, one of the only two where it had been significant *during* the crisis. For the regional portfolio, the coefficient on the S&P 500 return rises to 0.39.

V.3 Summary

A number of stylised facts can be drawn from the results in the previous two sections. During normal times, Asian market returns and closed-end fund returns influence each other, but the effect of the Asian returns on the funds is the greater. During the Asian crisis, the effect of the Asian markets on the funds declines, while that of the funds on the Asian markets increases. Movements in the S&P 500 (a proxy for the US market as a whole) become more important for the fund returns during the Asian crisis, but have a reduced impact on the Asian local markets (even as their indirect impact via the funds increases). After the crisis, the direction of causality again seems to go from the Asian local markets to the country funds, with effects in the reverse direction in most cases even weaker than before. The influence of the broader US market declines, but remains somewhat stronger than it had been before the crisis.

VI. Tracking the direction of influence: daily volatility

The previous section attempted to determine whether and in what ways the flow of "news" between the US and Asian markets changed during the Asian crisis, by looking at changes in market and fund returns. Another form of news, however, is volatility. An increase of price volatility in a given market could indicate a wider divergence of views among investors, increased activity by a previously passive group of investors, or a deterioration in liquidity conditions. When increased volatility in one market return is followed by increased volatility in a related return, after the assumed determinants of the two returns are accounted for, this could indicate that news about participation, liquidity, or changes of opinion in one market is relevant to market values in the other market.

Lagrange multiplier (LM) tests (available from the authors) confirm that, for all of the countries studied, the mean equations in systems (1) and (2) are characterised by autoregressive conditional heteroskedasticity. Using this fact, this section attempts to determine whether volatility is linked across regions - ie whether an unusually volatile day in one market is followed by an unusually volatile day in the other - and whether and how these patterns changed during the crisis period.

The GARCH(1,1) specifications in equations (1) and (2) enable us to ask a number of questions about the volatility of country-fund and local market returns. The coefficients on the time-period dummies in the variance equation of system (1) (γ_3 and γ_4) indicate whether volatility as a whole was higher during those periods compared with January 1995-June 1997. The coefficient on the squared local return (γ_5) in the variance equation indicates whether volatile market returns in Asia are followed by volatile returns on the corresponding country-funds in New York, *irrespective* of its effects on the levels of the returns. The coefficients on the interaction terms (γ_6 and γ_7) indicate whether volatility transfer was accentuated or dampened during these periods. The analogous interpretations hold for the δ coefficients in system (2).

Tables 8 and 9 present the estimated coefficients of the variance equations in (1) and (2). From January 1995 through June 1997, volatility tended to be transmitted strongly from the local markets to the country funds, but not vice versa. The squared local return has a positive, significant effect (at a 10% confidence level) on fund volatility for four of the six countries and for the six-country portfolio (Table 8). This effect changes somewhat for some of the national markets during the crisis and post-crisis periods, but generally not in a strong or consistent way. It rises for three countries (one significantly) after July 1997, then falls for four countries (two significantly, with a significant rise for Malaysia) after November 1998.

In contrast, the transmission of volatility from the funds to the Asian market did seem to change over the course of the sample period (Table 9). The squared fund return has a positive and significant effect on local-return volatility during the pre-crisis period for only one country (Malaysia). During the crisis,

this coefficient rises for five of the six countries, and becomes significant for three of them (although, puzzlingly, despite rising it is no longer significant for Malaysia). After the crisis, it declines for four countries, and remains significant and positive for only two of them, while becoming significantly *negative* for Malaysia.

The overall picture that emerges, although clouded by divergent results in certain countries, can be stated as follows. Before July 1997, volatility in local returns was strongly transmitted to country funds, while volatility transmission in the reverse direction was weaker. During the crisis, volatility tended to be transmitted strongly in both directions. After the crisis, volatility transmission in both directions tended to decline, and indeed was lower than before the crisis in most cases. This suggests that, to the extent that country-fund returns reflect the sentiment of US investors towards the Asian markets, this sentiment was much more important for market developments during the crisis than before or after. Local Asian market developments were about equally important for US sentiment regarding Asia before, during and after the crisis period.

There are two notable, and instructive, exceptions to this pattern. For Taiwan, volatility transmission in both directions was insignificant in the pre-crisis period and increased throughout the time under study. The volatility of the Taiwan fund return becomes significant and positive for local-return volatility in the post-crisis period. As already noted, Taiwan escaped the worst effects of the crisis. It is possible that, as western investors sought opportunities in the region in the aftermath of the crisis, Taiwan was seen as an especially promising market, strengthening linkages between western sentiment and local returns.

The other key exception is Malaysia, where the influence of local-return volatility on that of fund returns rose strongly after the crisis, while volatility transmisssion in the opposite direction becomes significantly negative (though small in absolute terms). These findings may reflect the imposition of capital controls in September 1998, as a result of which foreign holders of Malaysian shares were heavily affected by local returns but could do little to influence these returns by reallocating their portfolios. The low coefficient on fund-return volatility for the local return may thus reflect Malaysia's ability to insulate itself from foreign investor sentiment, while the high coefficient on volatility transmission in the opposite direction reflects the continuing interest that US investors had in local developments.

VII. Market sentiment and flows into Asian equities

Changes in sentiment between different classes of investors ought to be associated with portfolio shifts: we would expect investors who have become optimistic about a security's future returns to purchase it from those who are (or have become) pessimistic. Similarly, price changes that are not associated with portfolio shifts might indicate that all classes of investors have experienced a parallel shift in opinion. This section asks whether changes in US investor holdings of Asian equities were associated with differences in sentiment about Asian market prospects, using the local-return/fund-return relationship as an indicator of these differences in sentiment.

US purchases of Asian equities are measured using data from State Street Bank and Trust Co, a large US-based custodian of foreign securities. At August 1998, State Street was estimated to be the custodian for 40% of the securities holdings of US mutual funds (Froot et al, 1998). The data used in this study are net equity purchases and sales settled in the corresponding Asian currency, where the transaction is initiated by non-local investors. Thus, while these figures obviously do not account for all foreign purchases and shares of Asian equities, they are likely to offer a useful indicator of the size and direction of these flows.

Monthly figures were available on net purchases of equities by non-local investors in five of the six countries studied above (all except Taiwan). These were divided by the total capitalisation of the corresponding national stock market to obtain a capital-inflow indicator, summarised in Table 10 and Graph 6. One fact immediately apparent from these data is that they do not correspond neatly to the crisis period - while investors did engage in sustained selling over certain crisis periods from certain countries (for example, sales of Indonesian equities were high in the first months of 1998), one cannot establish a clear link between increased sales of Asian equities by foreign investors and the onset or persistence of crisis conditions in the Asian markets. The volatility of equity flows is generally higher during the crisis period than before or after, though even this is not the case for Indonesia and the Philippines.

To test whether fund inflows affected the pattern of information flows between local and foreign markets, fund returns and local market returns are estimated using the following GARCH specification:

$$
\begin{aligned}
FR_t^i &= \alpha_0 + \alpha_1 LR_t^i + \alpha_2 RR_t^i + \alpha_3 US_t + \alpha_4 FR_{t-1}^i \\
&\quad + \alpha_5 IF_t^i + \alpha_6 IF_t^i LR_t^i + \alpha_7 IF_t^i RR_t^i + \alpha_8 IF_t^i US_t + \alpha_9 IF_t^i FR_{t-1}^i + \alpha_{10} LR_{t-1}^{i\,2} + \varepsilon_t^i \\
\varepsilon_t^i &\sim N(0, h_t^i) \\
h_t^i &= \gamma_0 + \gamma_1 \varepsilon_t^{i\,2} + \gamma_2 h_{t-1}^i + \gamma_3 IF_t^i + \gamma_4 LR_t^{i\,2} + \gamma_5 IF_t^i LR_t^{i\,2}
\end{aligned}
\tag{3}
$$

and

$$
\begin{aligned}
LR_t^i &= \beta_0 + \beta_1 FR_{t-1}^i + \beta_2 FRO_{t-1}^i + \beta_3 US_{t-1} + \beta_4 LR_{t-1}^i + \beta_5 IF_{t-1}^i \\
&\quad + \beta_6 IF_{t-1}^i FR_{t-1}^i + \beta_7 IF_{t-1}^i FRO_{t-1}^i + \beta_8 IF_{t-1}^i US_{t-1} + \beta_9 IF_{t-1}^i LR_{t-1}^i + \beta_{10} FR_{t-1}^{i\,2} + \eta_t^i \\
\eta_t^i &\sim N(0, k_t^i) \\
k_t^i &= \delta_0 + \delta_1 \varepsilon_t^{i\,2} + \delta_2 h_{t-1}^i + \delta_3 IF_{t-1}^i + \delta_4 LR_t^{i\,2} + \delta_5 IF_{t-1}^i LR_t^{i\,2}
\end{aligned}
\tag{4}
$$

In both cases, the time dummies from equations (1)-(2) are replaced by the equity inflow indicator, IF_t, for the corresponding month. These specifications allow us to ask, first, whether local returns and fund returns are higher during months when flows into Asian equities are high; second, whether these returns have a greater influence on one another during such months; third, whether the returns are more volatile during such months; and fourth, whether volatility is transmitted more strongly during these months. Since, as noted above, equity inflows were neither notably high nor low during the crisis period, we can be fairly sure that we are not picking up the crisis effects by proxy.

Estimated coefficients for equations (3) and (4) are presented in Tables 11 and 12 respectively, for the five countries for which equity-purchase data were available and, in the first column of each table, for equally-weighted five-country portfolios of the fund returns and local returns.

While the level of the equity inflow variable has no significant effect on the country-fund returns (Table 11), it does have a positive effect on Asian local returns, which is significant at the 10% level or better for three countries and for the five-country portfolio (Table 12). The negative and significant coefficient on the interaction term in Table 11 helps to resolve the puzzle. When local returns are low, a high level of equity inflows corresponds to a high fund return. In other words, fund returns are linked to local returns in normal circumstances, but there are occasions on which local investors are pessimistic (as indicated by a low level of LR) while foreign investors are optimistic (as indicated by a high level of IF), resulting in a relatively higher fund return than one would otherwise have expected (as indicated by a strong negative coefficient on IF*LR).

In local markets, the coefficient on the interaction of equity flows and the fund return tends to be insignificant (Table 12). However, for the five-country portfolio the interaction between equity flows and the S&P 500 return is negative and significant. This suggests that, when foreign investor flows into Asian equities are large, the local markets tend to "decouple" from the US market, while period of low inflows or sales by foreign investors are associated with a strong correlation between local and US market returns.

A similar result holds for the volatilities of the returns. Normally, a volatile local return leads to a volatile fund return, though the reverse effect is less strong. Foreign purchases of Asian equities, by themselves, have little effect on the volatility of either return. However, a high level of foreign investor flows into Asian equities is associated with a lower transmission of volatility from Asia to the United States, for four of the five countries studied and for the five-country portfolio. In other words, excessive foreign investor optimism or pessimism can "override" the normal pattern of linkages between Asian and US markets.

While these effects tend to be significant in statistical terms, the lower two panels of Tables 11 and 12 indicate that they are not very strong in economic terms. When net equity inflows are "shocked" upward by one standard deviation (corresponding to events that, under a normal distribution, should occur about one third of the time), the fraction of the five-country portfolio of local returns incorporated into the five-country portfolio of fund returns falls from 0.63 to 0.58, while the coefficient on local-return

volatility in determining fund-return volatility falls from 0.14 to 0.11. The effects in the opposite direction are equally weak: the fund return's impact on local returns falls from 0.19 to 0.16, while the coefficient on fund-return volatility falls from 0.016 to 0.011. In other words, even if our equity-flow indicator reflects genuine shifts in patterns of information flows between local and US equity markets, these shifts tend to be relatively small.

VIII. Conclusion

The results presented in this paper form a more complicated picture than 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 selloff of Asian securities during the 1997-1998 crisis. Instead, US sentiment as indicated by closed-end fund premia tended to be positive relative to that of Asian investors, both during the period of the crisis and, for some countries, during its aftermath. On a daily level, both the level and volatility of returns on Asia-oriented closed-end country funds tended to be less responsive to local market returns during the crisis. This gap in sentiment was particularly strong during periods when US investors were net purchasers of Asian equities.

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. Rather than local returns and fund returns influencing one another, during the crisis period the direction of causation clearly ran from the fund returns (both their level and their volatility) towards the local returns. The driving factor here was the sentiment of those US investors oriented towards Asia, rather than the US stock market as a whole: Asian markets, which in non-market times tended to be more or less well-correlated with the S&P 500 index, de-coupled from the broader US market during the crisis period. This decoupling result is supported when equity inflows and outflows, rather than the presence or absence of crisis, are tested for their effects on the relationship between local and fund returns, with a weaker relationship detected in periods when US investor optimism (as proxied by net equity purchases by foreigners) is strong.

References

Bekaert, Geert and Campbell Harvey, 1998, Foreign speculators and emerging equity markets, Working Paper, Duke University.

Bekaert, Geert and Michael Urias, 1996, Diversification, Integration and Emerging Market Closed-End Funds, *Journal of Finance* 51, 835-869.

Bennett, P and J Kelleher, 1988, The International Transmission of Stock Price Disruption in October 1987, *Federal Reserve Bank of New York Quarterly Review* (Summer), 17-33.

Bodurtha, J M, D S Kim, and C M Lee, 1995, Closed-End Country Funds and US Market Sentiment, *Review of Financial Studies* 8, 879-918.

Bonser-Neal, Catherine, Gregory Brauer, Robert Neal, and Simon Wheatley, 1990, International Investment Restrictions and Closed-End Fund Prices, *Journal of Finance* 45, 523-547.

Brown, S J, W N Goetzmann, and J M Park, 1998, Hedge Funds and the Asian Crisis of 1997, Working Paper, Yale School of Management.

Clark, John and Elizabeth Berko, 1996, Foreign investment fluctuations and emerging stock returns: The case of Mexico, Federal Reserve Bank of New York.

Choe, Hyuk, Bong-Chan Kho, and Rene Stulz, 1999, Do Foreign Investors Destabilize Stock Markets: The Korean Experience in 1997, *Journal of Financial Economics* 54, 227-264.

Corsetti, G., P. Pesenti and N. Roubini, 1998, What Caused the Asian Currency and Financial Crisis? NBER Working Papers # 6833 (Part I) and 6834 (Part II).

Downes, John, and Jordan Elliot Goodman, 1991, *Dictionary of Finance and Investment Terms* (NY: Barron's).

Engle, R F, T Ito, and W-L Lin, 1990, Meteor Showers or Heat Waves? Heteroskedastic Intra-daily Volatility in the Foreign Exchange Market, *Econometrica* 58, 525-542.

Errunza, V, L W Senbet, and K Hogan, 1998, The Pricing of Country Funds from Emerging Markets: Theory and Evidence, *International Journal of Theoretical and Applied Finance* 1, 111-43.

Frankel, J and S Schmukler, 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.

Froot, Kenneth A, Paul G J O'Connell, and Mark Seasholes, 1998, The Portfolio Flows of International Investors I, NBER Working Paper 6687.

Glosten, L R, R Jagannathan, and D E Runkle, 1993, On the Relation between the Expected Value and the Volatility of the Nominal Excess Return on Stocks, *Journal of Finance* 48, 1779-1801.

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

King, M and S Wadhwani, 1990, Transmission of Volatility between Stock Markets, *Review of Financial Studies* 3, 5-33.

Klibanoff, P, O Lamont, and T Wizman, 1998, Investor Reaction to Salient News in Closed-End Country Funds, *Journal of Finance* 53, 673-99.

Kramer, Charles and Richard Todd Smith, 1995, Recent Turmoil in Emerging Markets and the Behavior of Country Fund Discounts: Renewing the Puzzle of the Pricing of Closed End Mutual Funds, IMF Working Paper.

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

Krugman, P, 1999, Balance Sheets, the Transfer Problem, and Finanancial Crises, working paper

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

Levy-Yeyati, Eduardo and Angel Ubide, 1998, Crisis, Contagion, and the Closed-End Fund Puzzle, IMF Working Paper, 1998.

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

McKinnon, R and H Pill, 1998, Overborrowing: A Decomposition of Credit and Currency Risks, *World Development*.

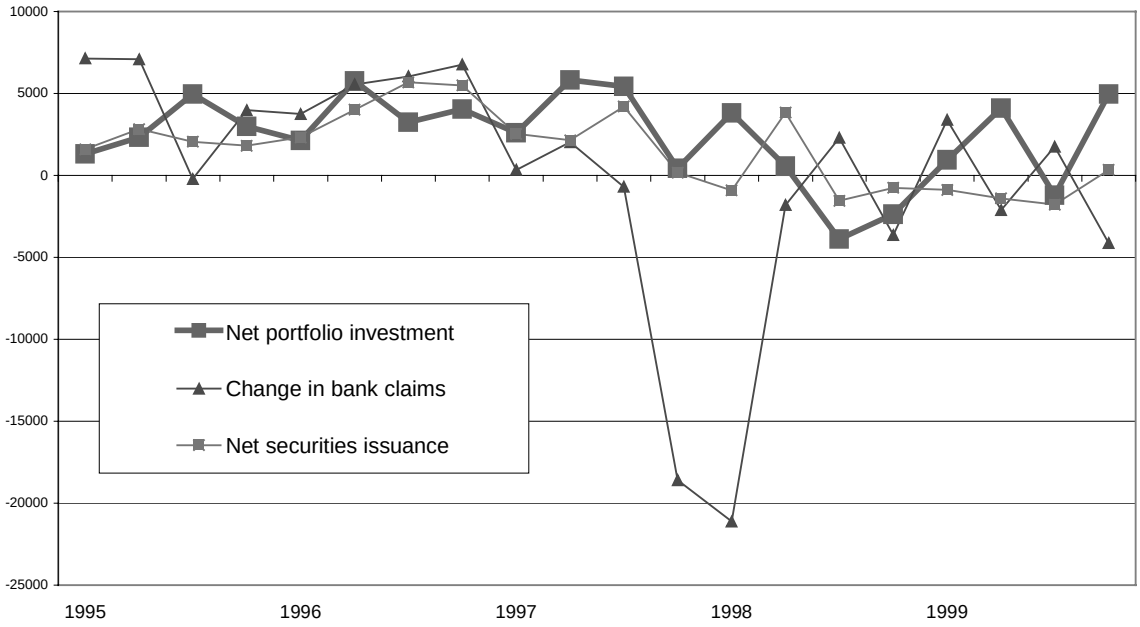
Moreno, R, G Pasadilla, and E Remolona, 1998, Asia's Financial Crisis: Lessons and Policy Responses, In *Asia: Responding to Crisis*, Tokyo: Asian Development Bank Institute.

Tesar, Linda and Ligrid Werner, 1995, Home Bias and High Turnover, *Journal of International Money and Finance* 14, 467-492.

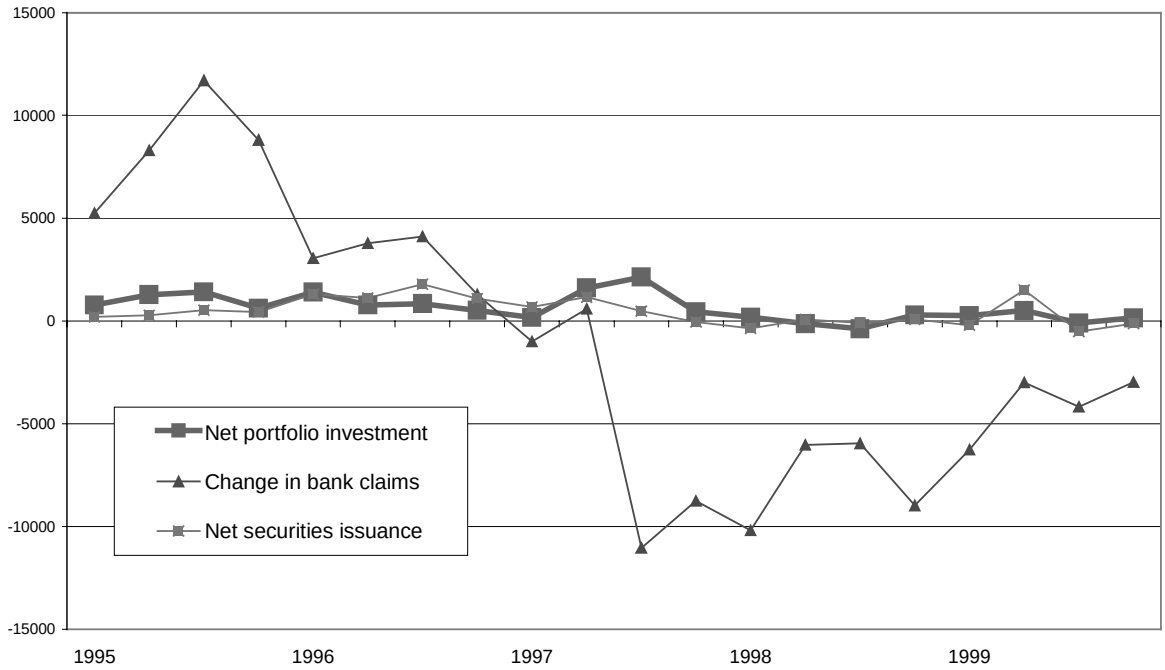
Wermers, R, 1998, Mutual fund herding and the impact on stock prices, *Journal of Finance*, forthcoming.

Wolf, M, 1998, Flows and Blows, *Financial Times*, 3 March 1998.

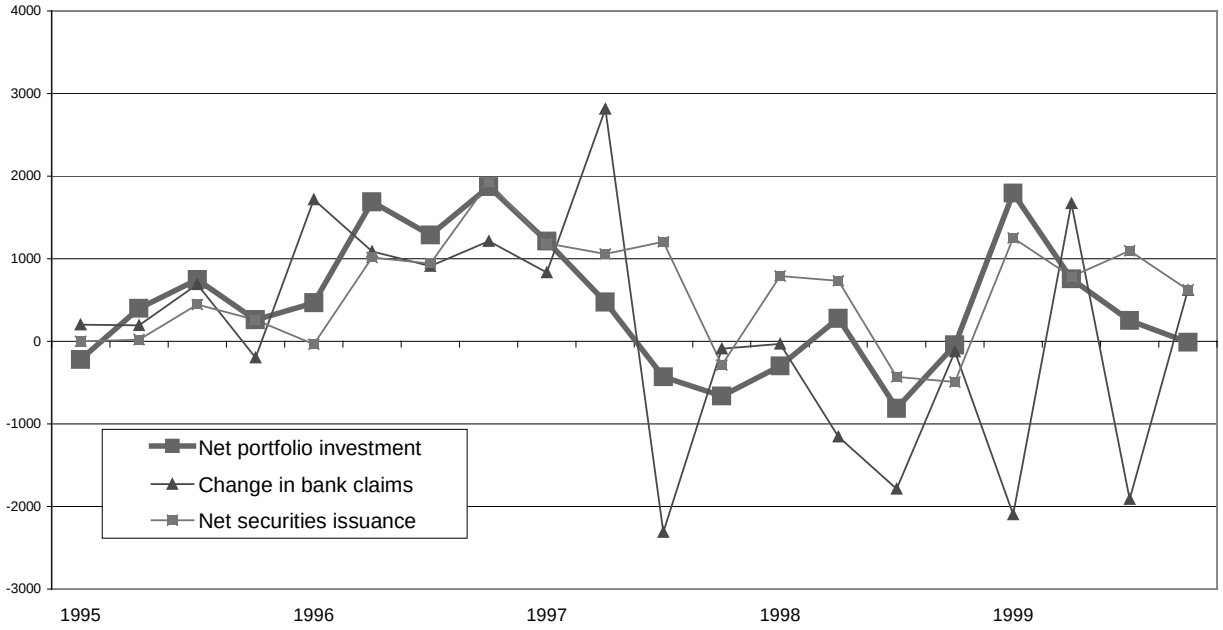
Graph 1a. Components of net portfolio investment (US$M.): Korea



Graph 1b. Components of net portfolio investment (US$M.): Thailand

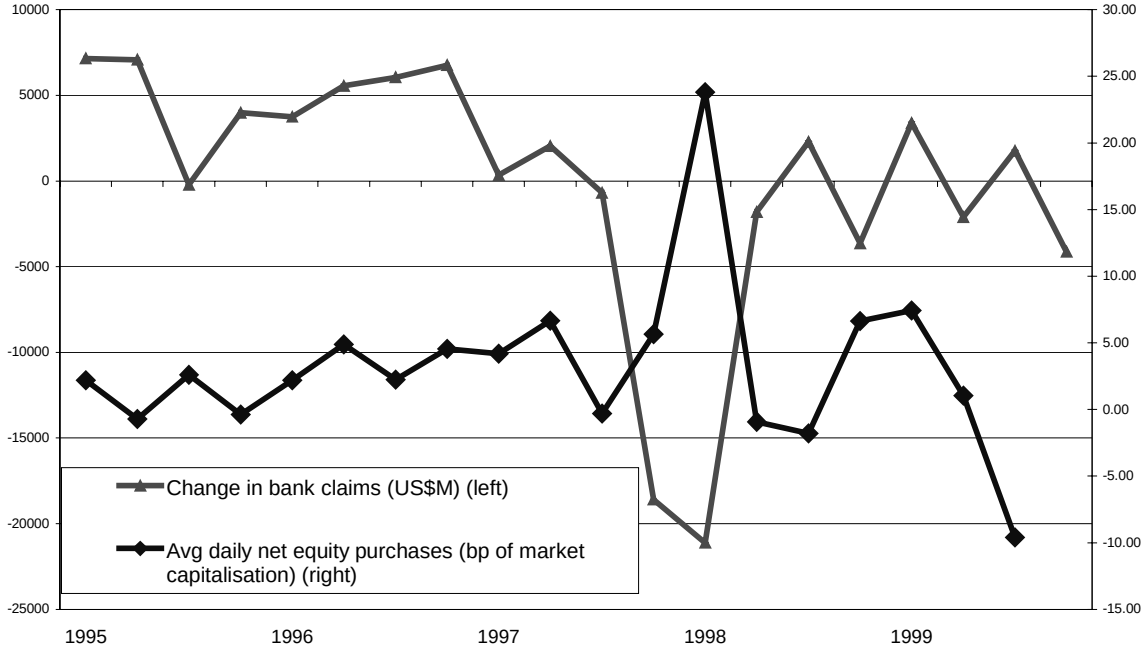


Graph 1c. Components of net portfolio investment (US$M): Philippines

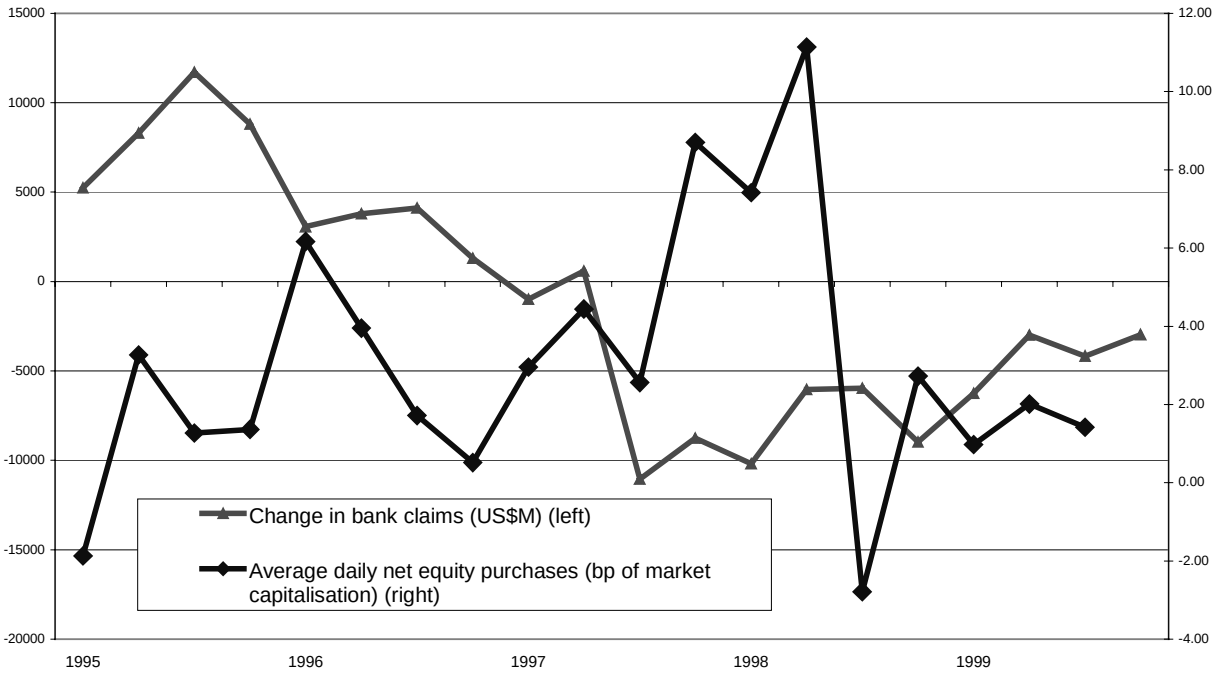


Source (all graphs): IMF, BIS.

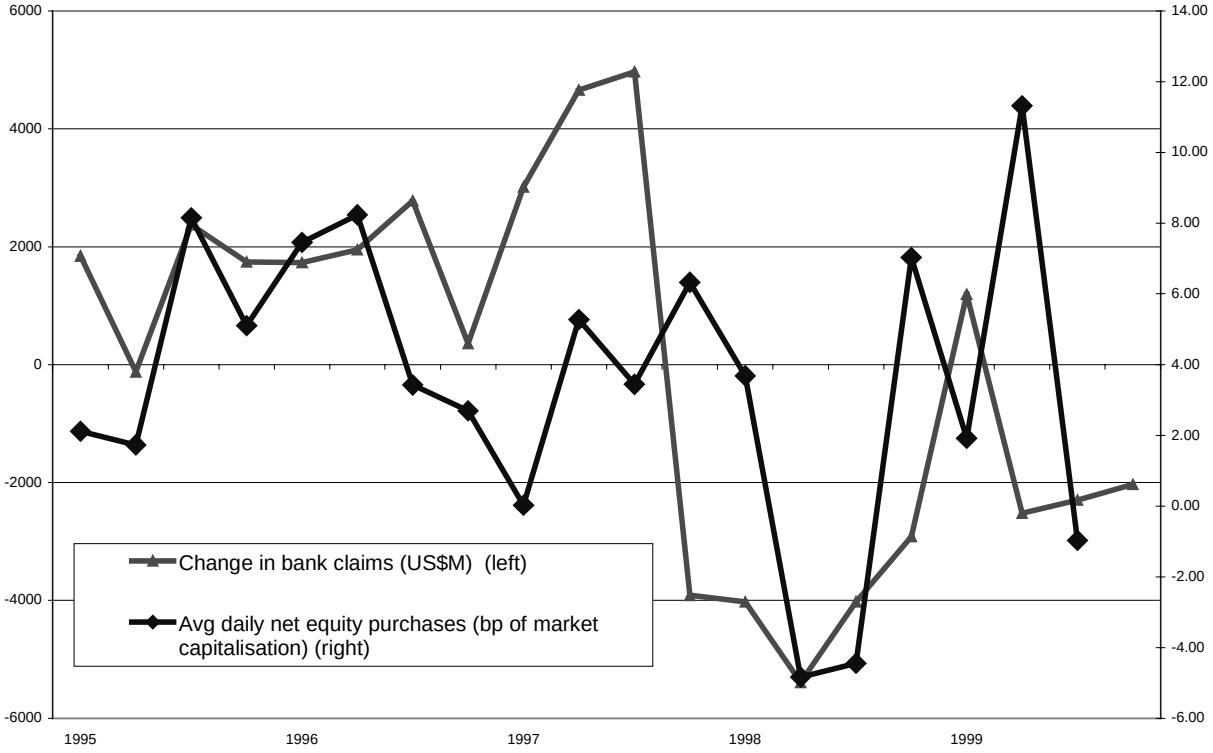
Graph 2a. Banks and equity investors compared: Korea



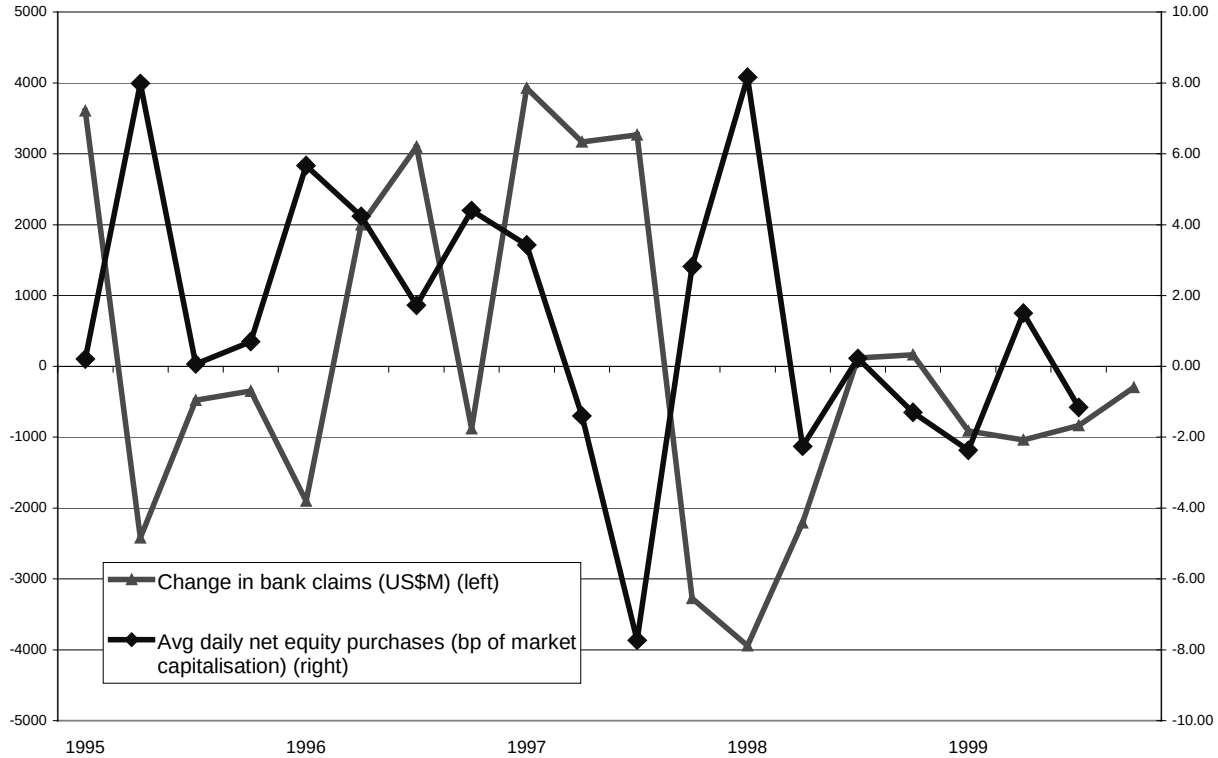
Graph 2b. Banks and equity investors compared: Thailand



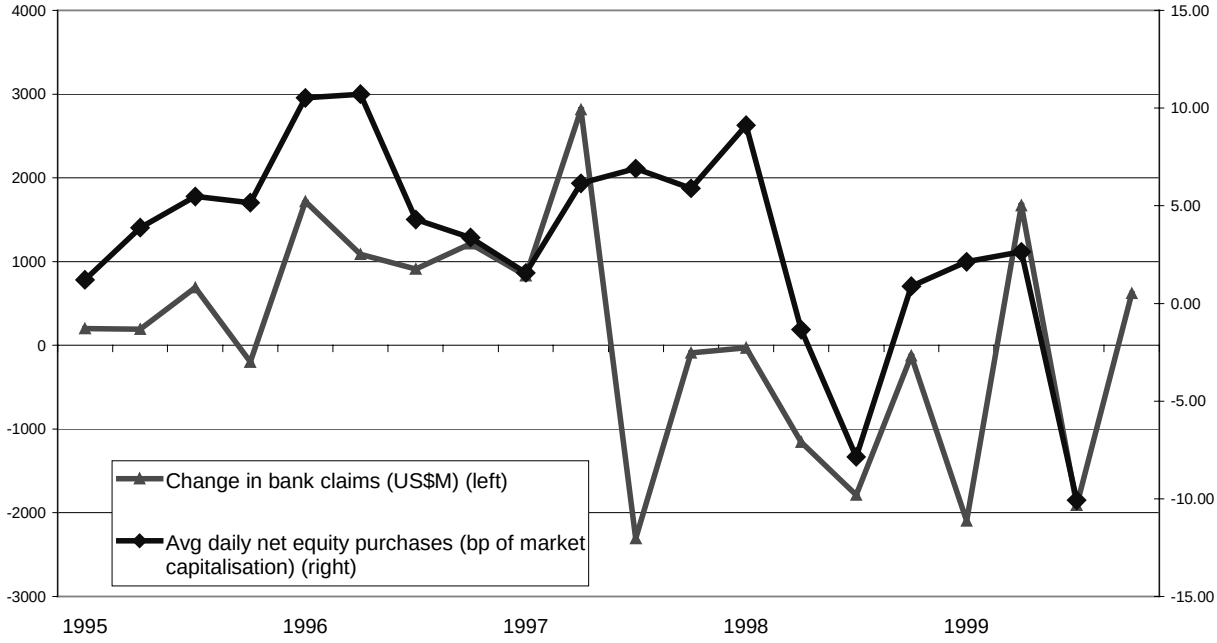
Graph 2c. Banks and equity investors compared: Indonesia



Graph 2d. Banks and equity investors compared: Malaysia

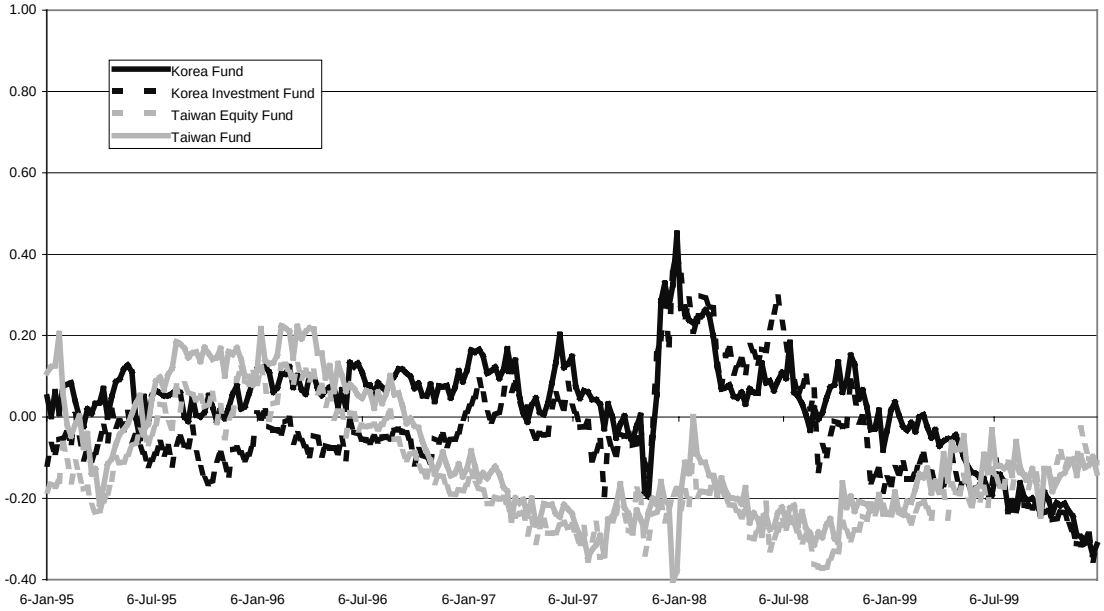


Graph 2e. Banks and equity investors compared: Philippines

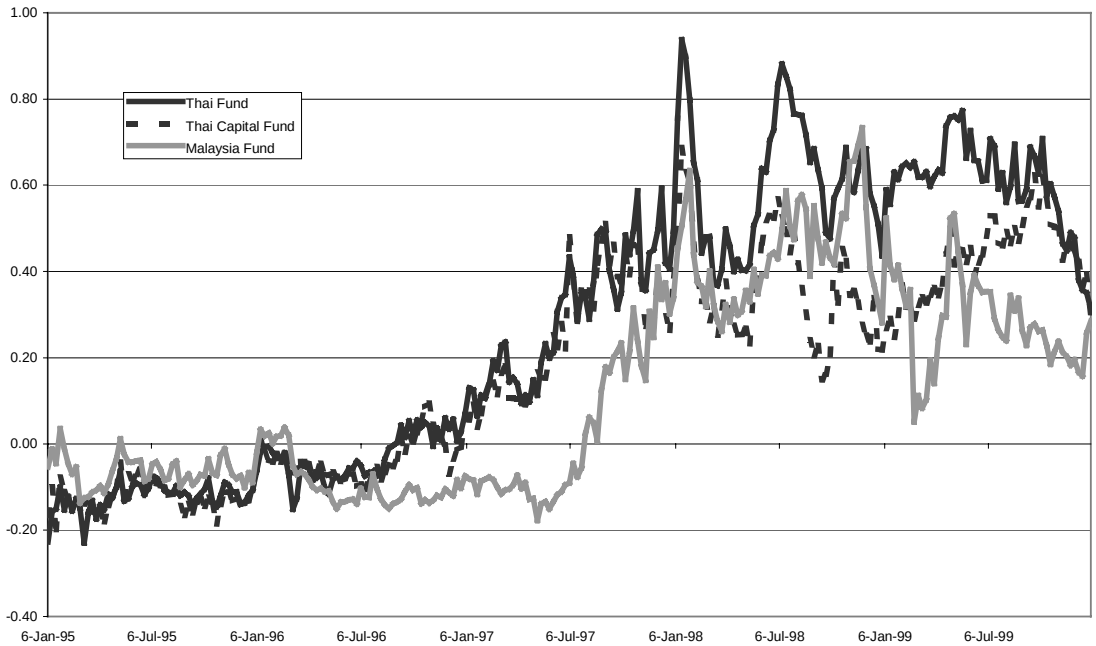


Source (all graphs): BIS, State Street.

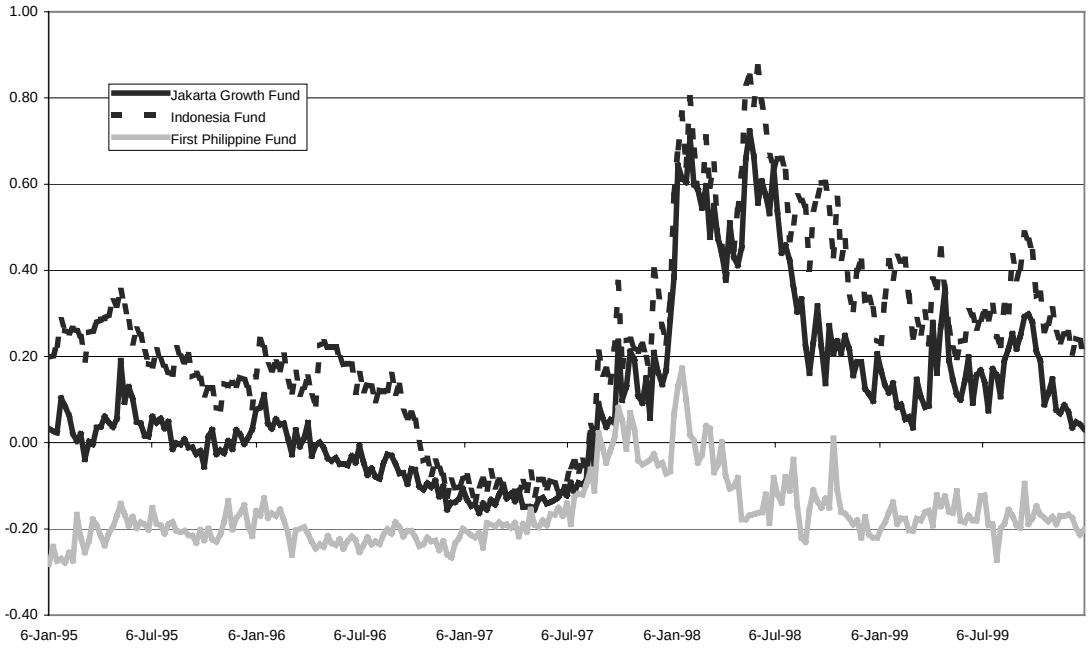
Graph 3a. Premium of price over net asset value



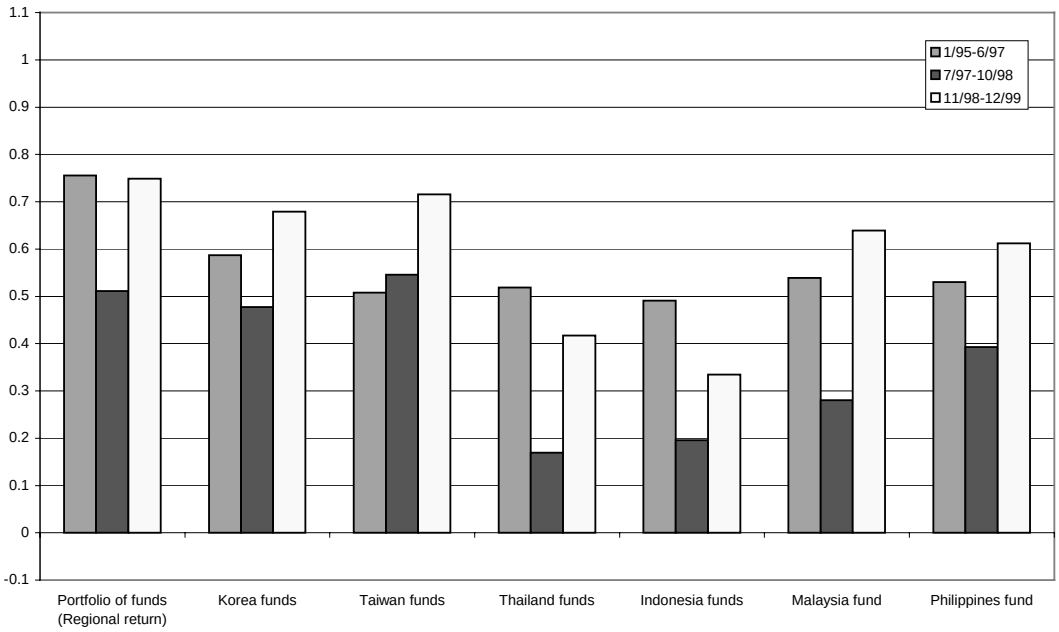
Graph 3b. Premium of price over net asset value (cont.)



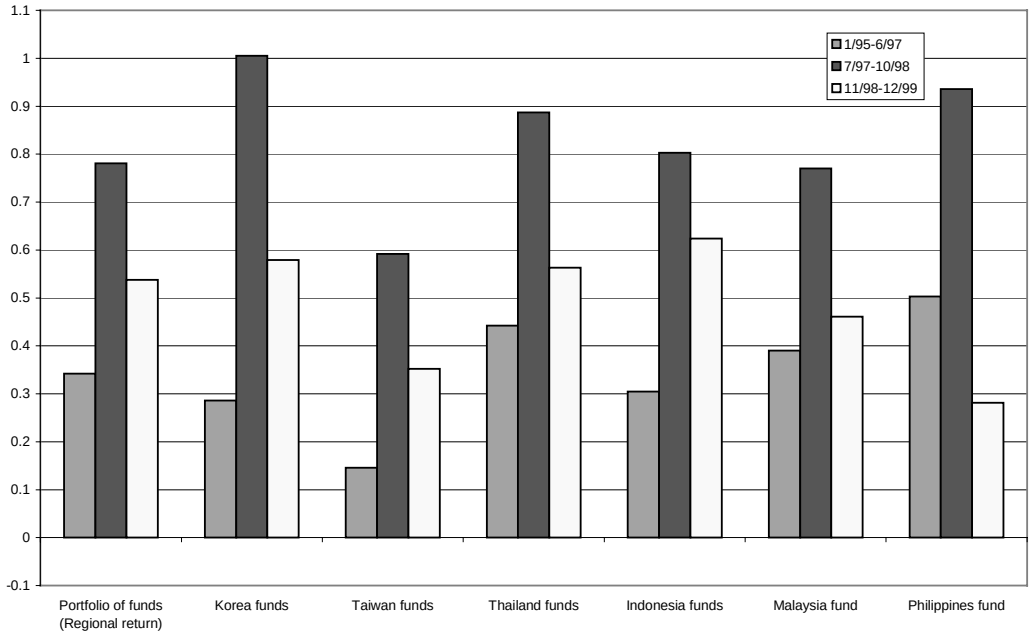
Graph 3c. Premium of price over net asset value (cont.)



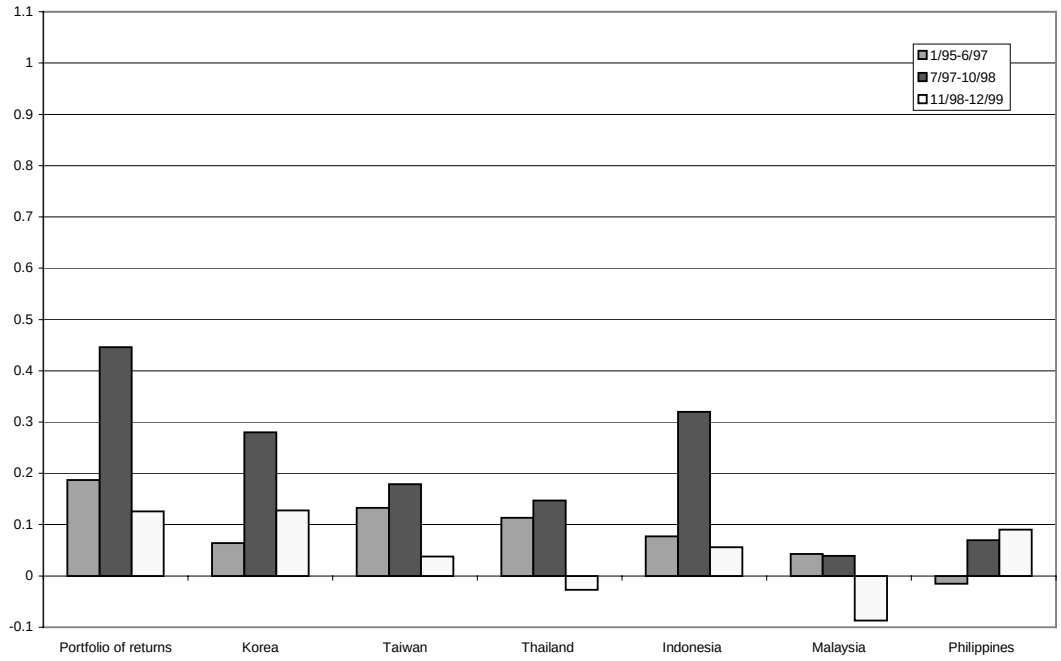
Graph 4a. Effect of local market return on fund return



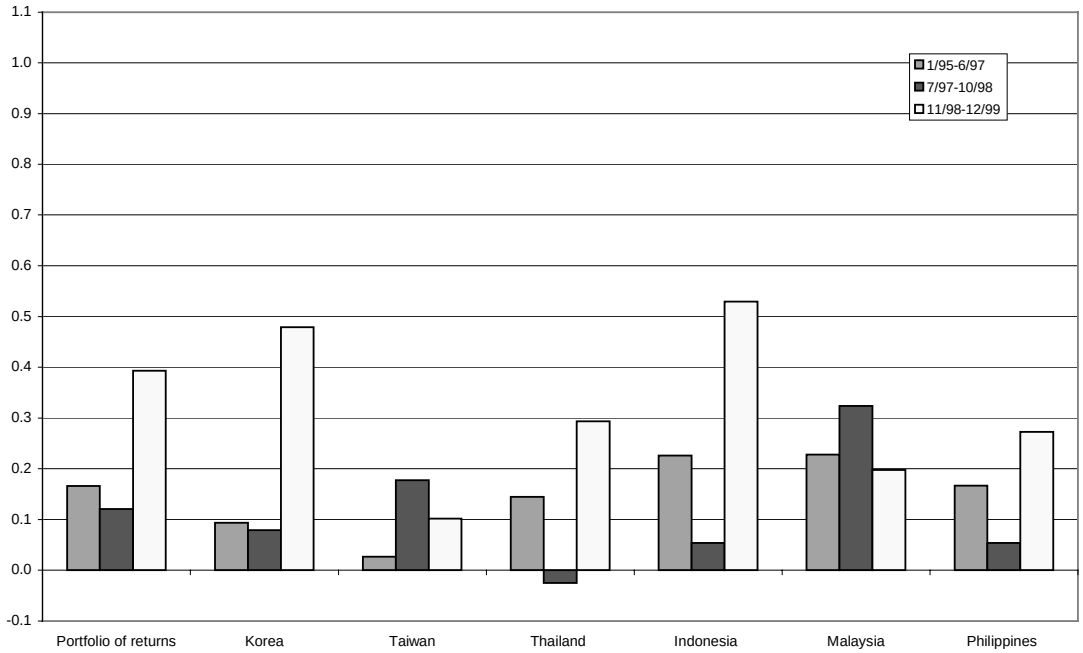
Graph 4b. Effect of S&P 500 return on fund return



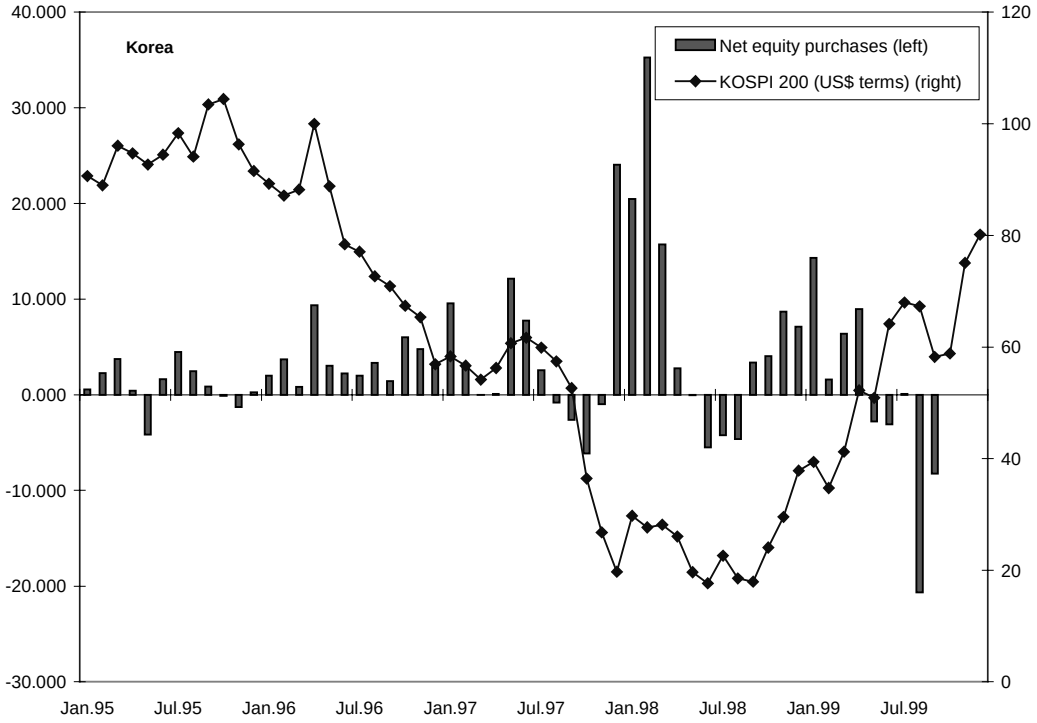
Graph 5a. Effect of previous day's fund return on local market return



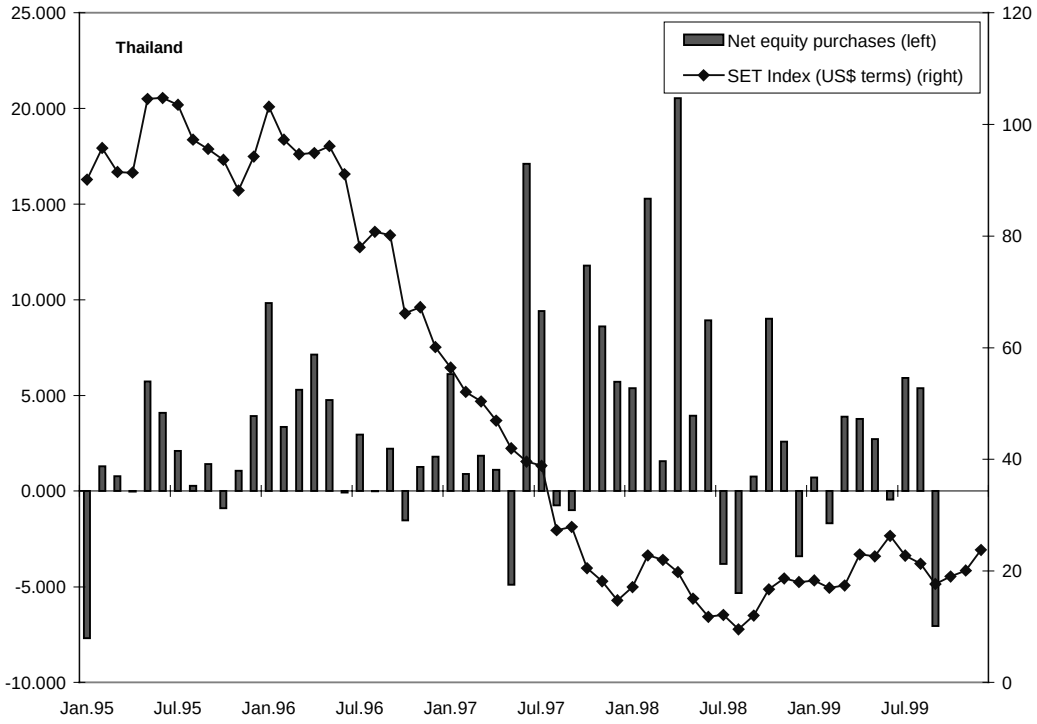
Graph 5b. Effect of previous day's S&P 500 return on local market return



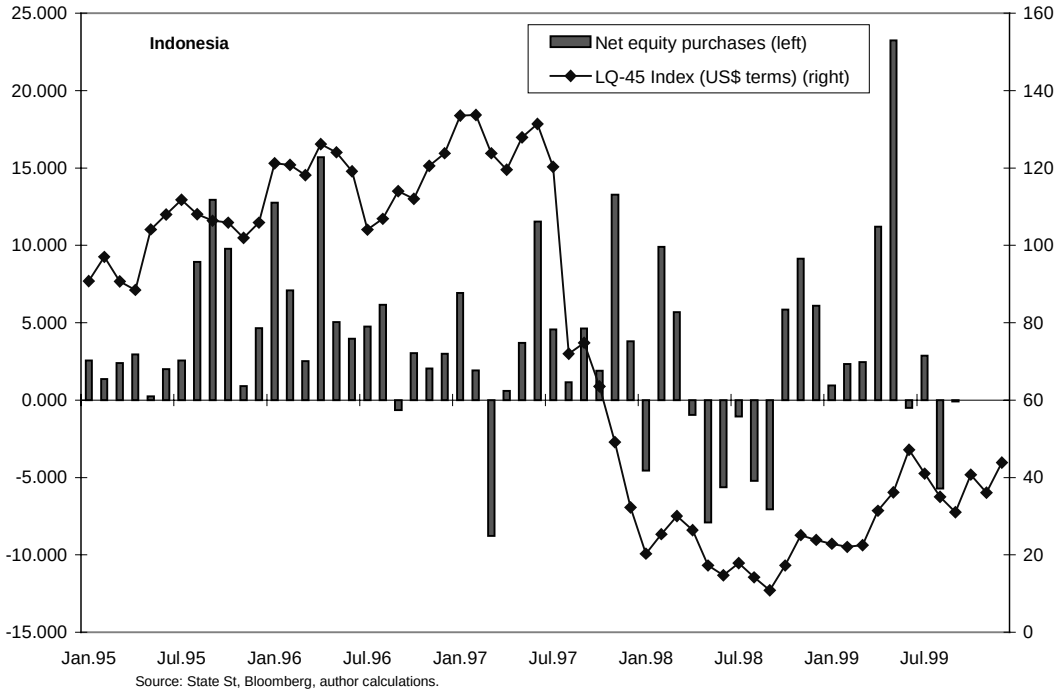
Graph 6. Purchases of equities by foreign investors and local market indices



Source: State St., Bloomberg, author calculations.



Source: State St., Bloomberg, author calculations.



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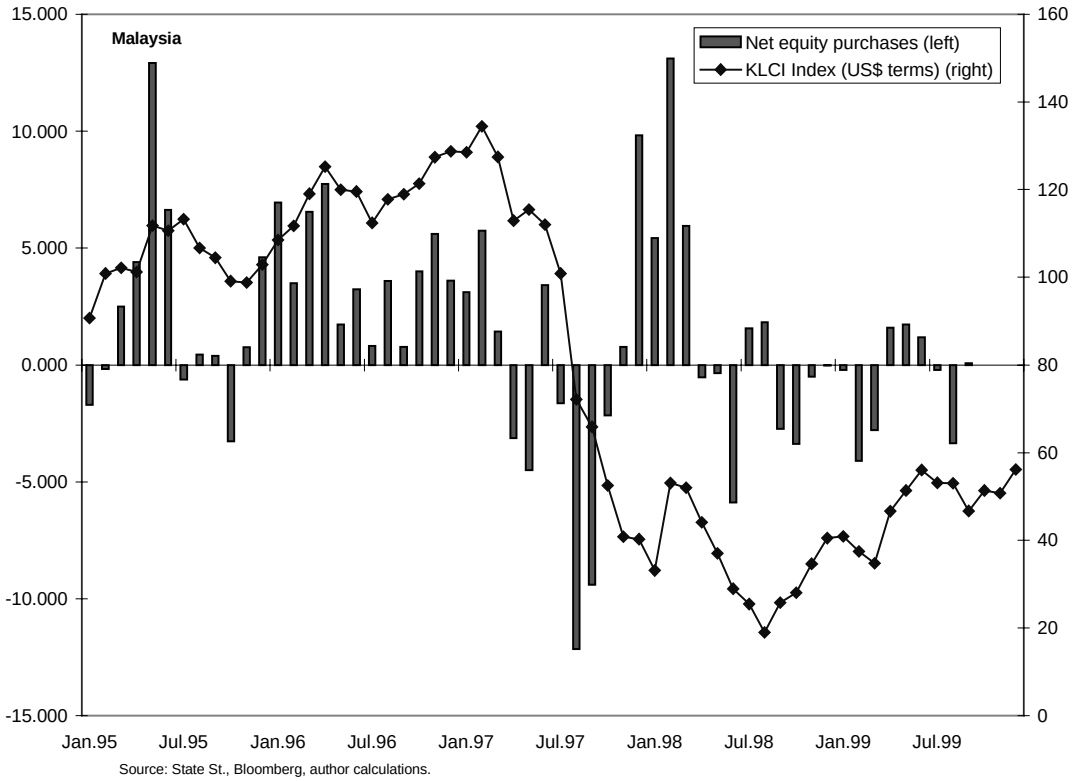
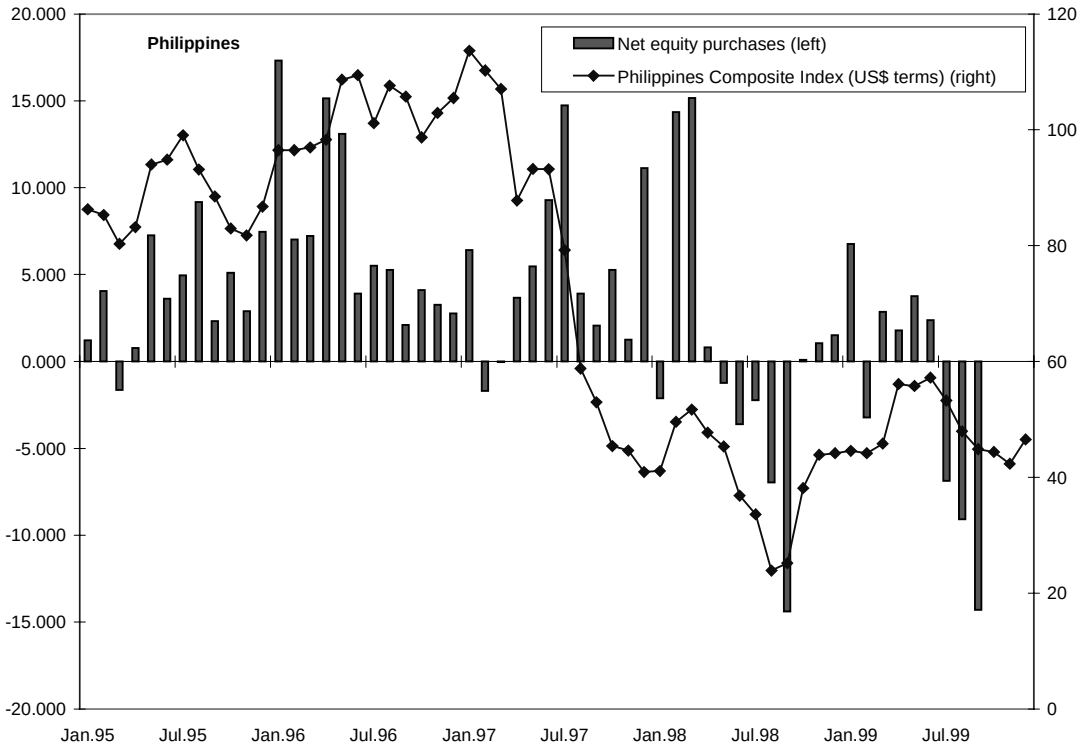


Source: State St., Bloomberg, author calculations.



Source: State St., Bloomberg, author calculations.

Table 1

Capital flows to Asian countries

(US$ bn)

	1995	1996	1997	1998	1999
	Indonesia				
Direct investment	3.7	5.6	4.5	– 0.4	– 1.5[1]
Portfolio investment	4.1	5.0	– 2.6	– 1.9	– 1.5[1]
Other investments	2.4	0.2	0.6	– 1.6	0.8[1]
Current account balance	*– 6.4*	*– 7.7*	*– 4.9*	*4.1*	*3.9*[1]
Change in reserves	*– 1.6*	*– 4.5*	*5.1*	*– 2.1*	*– 3.3*[1]
	Korea				
Direct investment	– 1.8	– 2.3	– 1.6	0.6	4.8
Portfolio investment	11.6	15.2	14.3	– 1.9	8.8
Other investments	7.5	11.1	– 10.8	– 2.1	– 12.7
Current account balance	*– 8.5*	*– 23.0*	*– 8.2*	*40.6*	*25.0*
Change in reserves	*– 7.0*	*– 1.4*	*11.9*	*– 31.0*	*– 23.0*
	Malaysia				
Direct investment	4.2	5.1	5.1		
Portfolio investment	– 0.4	– 0.3	– 0.2		
Other investments	3.9	4.7	– 2.1		
Current account balance	*– 8.5*	*– 4.6*	*– 4.8*	*9.4*	*12.5*
Change in reserves	*1.8*	*– 2.5*	*3.9*	*– 10.6*	*– 4.7*
	The Philippines				
Direct investment	1.1	1.3	1.1	1.6	0.7
Portfolio investment	1.2	5.3	0.6	– 0.9	2.8
Other investments	2.7	4.3	5.3	0.9	– 0.4[1]
Current account balance	*– 2.0*	*– 4.0*	*– 4.4*	*1.3*	*7.0*
Change in reserves	*– 0.9*	*– 4.0*	*2.6*	*– 1.9*	*– 4.0*
	Taiwan				
Direct investment	– 1.4	– 2.0	– 3.0	– 3.6	– 1.5
Portfolio investment	0.5	– 1.1	– 8.3	– 2.4	9.1
Other investments	– 7.3	– 5.7	3.1	8.5	5.5
Current account balance	*5.5*	*11.0*	*7.8*	*3.4*	*5.9*
Change in reserves	*3.9*	*– 1.1*	*0.7*	*– 4.8*	*– 18.6*
	Thailand				
Direct investment	1.2	1.4	3.4	6.8	5.3
Portfolio investment	4.1	3.5	4.4	– 0.0	0.8
Other investments	16.6	14.5	– 16.2	– 16.6	– 12.2
Current account balance	*– 13.6*	*– 14.7*	*– 3.0*	*14.0*	*11.0*
Change in reserves	*– 7.2*	*– 2.2*	*9.9*	*– 1.4*	*– 4.6*

[1] Up to third quarter 1999.

Sources: IMF, *Balance of payments*; national data.

Table 2

Asian closed-end country funds

Fund	Date of inception	Market capitalisation ($M.)	Average premium 1995-99	Premium at 31 December 1999
Korea Fund	08/29/84	825	+ 0.03	– 0.31
Korean Investment Fund	02/01/92	71	– 0.04	– 0.31
Taiwan Equity Fund	07/01/94	NA	– 0.15	– 0.11
Taiwan Fund	12/01/86	NA	– 0.09	– 0.14
Thai Fund	02/01/88	97	+ 0.27	+ 0.31
Thai Capital Fund	05/01/90	NA	+ 0.18	+ 0.30
Jakarta Growth Fund	04/01/90	16	+ 0.10	+ 0.03
Indonesia Fund	03/09/90	24	+ 0.24	+ 0.19
Malaysia Fund	05/01/87	70	+ 0.12	+ 0.28
First Philippine Fund	11/01/89	56	– 0.16	– 0.20
Average		**166**	**+ 0.05**	**+ 0.00**

Source: Bloomberg; author's calculations. 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.

Table 3

Correlations of fund premia

Correlations of levels

	Korean Inv. Fund	Taiwan Equity Fund	Taiwan Fund	Thai Fund	Thai Capital Fund	Jakarta Growth Fund	Indon. Fund	Malaysia Fund	First Phil. Fund
Korea Fund	0.81	0.02	0.09	– 0.25	– 0.32	0.06	0.00	– 0.15	0.18
Korean Investment Fund		– 0.25	– 0.22	0.11	0.07	0.45	0.32	0.18	0.43
Taiwan Equity Fund			0.94	– 0.66	– 0.62	– 0.30	– 0.24	– 0.51	– 0.36
Taiwan Fund				– 0.70	– 0.69	– 0.31	– 0.23	– 0.53	– 0.40
Thai Fund					0.94	0.63	0.57	0.87	0.52
Thai Capital Fund						0.57	0.47	0.76	0.57
Jakarta Growth Fund							0.93	0.78	0.56
Indonesia Fund								0.77	0.43
Malaysia Fund									0.52

Correlations of weekly changes

	Korean Inv. Fund	Taiwan Equity Fund	Taiwan Fund	Thai Fund	Thai Capital Fund	Jakarta Growth Fund	Indon. Fund	Malaysia Fund	First Phil. Fund
Korea Fund	0.48	0.12	0.02	0.17	0.19	0.13	0.09	0.12	– 0.02
Korean Investment Fund		0.02	– 0.08	0.10	0.04	– 0.04	0.01	– 0.09	– 0.05
Taiwan Equity Fund			0.57	0.08	0.10	0.08	0.02	0.19	0.11
Taiwan Fund				0.14	0.13	0.10	0.06	0.24	0.12
Thai Fund					0.52	0.14	0.08	0.27	0.24
Thai Capital Fund						0.19	0.04	0.21	0.15
Jakarta Growth Fund							0.54	0.23	0.15
Indonesia Fund								0.19	0.08
Malaysia Fund									0.24

Table 4

Average premia over selected time periods

Fund	Jan 1995 - Jun 1997	July 1997 - Oct 1998	Nov 1998 - Dec 1999
Korea Fund	+ 0.069 (0.004)	+ 0.088** (0.014)	– 0.122** (0.014)
Korean Investment Fund	– 0.046 (0.005)	+ 0.085** (0.017)	– 0.179** (0.010)
Taiwan Equity Fund	– 0.074 (0.011)	– 0.258** (0.007)	– 0.178** (0.007)
Taiwan Fund	+ 0.008 (0.012)	– 0.233** (0.008)	– 0.153** (0.007)
Thai Fund	– 0.027 (0.010)	+ 0.539** (0.020)	+ 0.602** (0.013)
Thai Capital Fund	– 0.036 (0.009)	+ 0.379** (0.013)	+ 0.409** (0.013)
Jakarta Growth Fund	– 0.031 (0.007)	+ 0.305** (0.028)	+ 0.149** (0.010)
Indonesia Fund	+ 0.104 (0.012)	+ 0.433** (0.031)	+ 0.317** (0.010)
Malaysia Fund	– 0.083 (0.004)	+ 0.328** (0.021)	+ 0.317 (0.019)
First Philippine Fund	– 0.207 (0.003)	– 0.069** (0.010)	– 0.176** (0.004)
Average	**– 0.03**	**+ 0.16**	**+ 0.10**

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.

Source: Bloomberg; author's calculations.

Table 5

Local stock markets: capitalisation data and indices used in daily regressions

Country	Market capitalisation (US$bn)		Index	Number of index members
	End-1994	End-1999		
Korea	192	309	KOSPI 200 Index	200
Taiwan	247	376	TWSE Weighted Index	452
Thailand	131	58	Bangkok SET Index	394
Indonesia	47	64	Jakarta LQ-45 Index	45
Malaysia	199	145	KL Composite Index	100
Philippines	56	48	Philippines Composite Index	33

Source: IFC; Bloomberg.

Table 6

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

The first panel of this table reports slope coefficients and z-statistics (using Bollerslev-Wooldridge QML standard errors) for the mean equation in the following GARCH system:

$$FR_t^i = \alpha_0 + \alpha_1 LR_t^i + \alpha_2 RR_t^i + \alpha_3 US_t + \alpha_4 FR_{t-1}^i + \alpha_5 d_t^{797} + \alpha_6 d_t^{797} LR_t^{\ i} + \alpha_7 d_t^{797} RR_t^i + \alpha_8 d_t^{797} US_t + \alpha_9 d_t^{797} FR_{t-1}^i + \alpha_{10} d_t^{1198} + \alpha_{11} d_t^{1198} LR_t^{\ i} + \alpha_{12} d_t^{1198} RR_t^i + \alpha_{13} d_t^{1198} US_t + \alpha_{14} d_t^{1198} FR_{t-1}^i + \alpha_{15} LR_t^{i\,2} + \varepsilon_t^i$$

$$\varepsilon_t^i \sim N(0, h_t^i)$$

$$h_t^i = \gamma_0 + \gamma_1 \varepsilon_t^{i\,2} + \gamma_2 h_{t-1}^i + \gamma_3 d_t^{797} + \gamma_4 d_t^{1198} + \gamma_5 LR_t^{i\,2} + \gamma_6 d_t^{797} LR_t^{i\,2} + \gamma_7 d_t^{797} LR_t^{i\,2}$$

In the first column, the "portfolio of funds" is an equally weighted average of the country-fund returns; it is regressed on a constant, the US market return, an equally weighted portfolio of local market returns, its own lag, and interactions of these variables with the crisis dummy.

Constant term and coefficients on the lagged dependent variable are not reported. 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 $\alpha_1+\alpha_6$, $\alpha_2+\alpha_7$, and $\alpha_3+\alpha_8$). The third panel reports the totals for when d_t^{1198} equals 1 (ie $\alpha_1+\alpha_6+\alpha_{11}$, 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	Korea funds	Taiwan funds	Thailand funds	Indonesia funds	Malaysia fund	Philippines fund
d_t^{797}	– 0.002* (– 1.81)	– 0.002 (– 1.57)	– 0.001 (– 0.49)	– 0.001 (– 0.85)	– 0.003* (– 1.79)	– 0.002 (– 1.24)	– 0.002 (– 1.34)
d_t^{1198}	0.001 (1.22)	0.003* (1.81)	0.002 (1.29)	0.000 (0.14)	0.002 (0.82)	0.001 (0.29)	0.002 (1.12)
LR_t^i	0.756** (15.72)	0.587** (14.06)	0.508** (12.76)	0.519** (13.46)	0.491** (8.86)	0.539** (9.01)	0.530** (10.76)
$d_t^{797} LR_t^i$	– 0.246** (– 3.57)	– 0.110* (– 1.91)	0.038 (0.55)	– 0.350** (– 3.53)	– 0.295** (– 4.41)	– 0.259** (– 3.19)	– 0.137* (– 1.67)
$d_t^{1198} LR_t^i$	0.238** (2.74)	0.203** (3.96)	0.170** (2.09)	0.248** (2.32)	0.139** (2.27)	0.359** (2.78)	0.219** (2.12)
RR_t^i		0.194** (2.51)	0.322** (2.85)	0.246** (2.84)	0.187** (2.51)	0.230** (2.44)	0.256** (3.41)
$d_t^{797} RR_t^i$		– 0.126 (– 1.33)	– 0.282** (– 2.33)	0.006 (0.05)	0.223** (2.01)	0.026 (0.22)	– 0.148* (– 1.65)
$d_t^{1198} RR_t^i$		0.090 (1.00)	0.066 (0.76)	– 0.113 (– 0.79)	0.069 (0.41)	0.243** (1.97)	0.110 (1.05)
US_t	0.342** (12.33)	0.286** (4.07)	0.146* (1.90)	0.442** (6.86)	0.305** (3.78)	0.390** (5.68)	0.503** (5.42)
$d_t^{797} US_t$	0.439** (6.40)	0.719** (4.93)	0.447** (4.44)	0.445** (2.43)	0.497** (2.99)	0.380** (2.75)	0.433** (2.67)
$d_t^{1198} US_t$	– 0.242** (– 2.80)	– 0.427** (– 2.84)	– 0.240** (– 2.18)	– 0.324 (– 1.59)	– 0.178 (– 0.83)	– 0.309* (– 1.66)	– 0.655** (– 3.99)
N	1302	1302	1302	1302	1302	1302	1302
Adj R^2	0.31	0.49	0.35	0.29	0.30	0.26	0.31

Table 6 (contd)

Effects during 07/97 - 10/98:							
LR_t^i	0.511**	0.477**	0.546**	0.169*	0.196**	0.280**	0.393**
RR_t^i		0.068	0.040	0.252**	0.410**	0.256**	0.108**
US_t	0.781**	1.005**	0.592**	0.887**	0.803**	0.770**	0.936**
Effects during 11/98 - 12/99:							
LR_t^i	0.749**	0.679**	0.716**	0.417**	0.335**	0.639**	0.612**
RR_t^i		0.158**	0.106	0.139	0.479**	0.499**	0.218**
US_t	0.538**	0.579**	0.352**	0.563**	0.624**	0.461**	0.281**

Table 7

Does New York market sentiment drive Asian local returns?

The first panel of this table reports slope coefficients and z-statistics (using Bollerslev-Wooldridge QML standard errors) for the mean equation in the following system:

$$LR_t^i = \beta_0 + \beta_1 FR_{t-1}^i + \beta_2 FRO_{t-1}^i + \beta_3 US_{t-1} + \beta_4 LR_{t-1}^i + \beta_5 d_{t-1}^{797} + \beta_6 d_{t-1}^{797} FR_{t-1}^i + \beta_7 d_{t-1}^{797} FRO_{t-1}^i + \beta_8 d_{t-1}^{797} US_{t-1} + \beta_9 d_{t-1}^{797} LR_{t-1}^i + \beta_{10} d_{t-1}^{1198} + \beta_{11} d_{t-1}^{1198} FR_{t-1}^i + \beta_{12} d_{t-1}^{1198} FRO_{t-1}^i + \beta_{13} d_{t-1}^{1198} US_{t-1} + \beta_{14} d_{t-1}^{1198} LR_{t-1}^i + \beta_{15} FR_{t-1}^{i\ 2} + \eta_t^i$$

$$\eta_t^i \sim N(0, k_t^i)$$

$$k_t^i = \delta_0 + \delta_1 \eta_t^{i\ 2} + \delta_2 k_{t-1}^i + \delta_3 d_{t-1}^{797} + \delta_4 d_{t-1}^{1198} + \delta_5 FR_{t-1}^{i\ 2} + \delta_6 d_{t-1}^{797} FR_{t-1}^{i\ 2} + \delta_7 d_{t-1}^{1198} FR_{t-1}^{i\ 2}$$

In the first column, the "portfolio of local returns" is an equally weighted average of the local dollar returns; it is regressed on a constant, the US market return, an equally weighted portfolio of fund returns, its own lag, and interactions of these variables with the crisis dummy.

Constant term and coefficients on the lagged dependent variable are not reported. 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 country-fund nd US returns during the period when d_t^{797} equals 1 (ie $\beta_1+\beta_6$, $\beta_2+\beta_7$, and $\beta_3+\beta_8$). The third panel reports the totals for when d_t^{1198} equals 1 (ie $\beta_1+\beta_6+\beta_{11}$, 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	Korea local return	Taiwan local return	Thailand local return	Indonesia local return	Malaysia local return	Philippines local return
d_{t-1}^{797}	– 0.002 (– 1.51)	– 0.001 (– 0.55)	– 0.002** (– 2.00)	– 0.002 (– 1.26)	– 0.003 (– 1.33)	– 0.006** (– 3.29)	– 0.003* (– 1.70)
d_{t-1}^{1198}	0.003** (3.40)	0.004** (1.99)	0.002 (1.53)	0.004* (1.65)	0.004 (1.29)	0.006** (3.33)	0.002 (1.21)
FR_{t-1}^i	0.187 (1.59)	0.064 (1.31)	0.133** (3.05)	0.113** (2.30)	0.077** (2.30)	0.043 (1.58)	– 0.015 (– 0.37)
$d_{t-1}^{797} FR_{t-1}^i$	0.259** (2.09)	0.215** (2.57)	0.046 (0.57)	0.033 (0.40)	0.243** (2.45)	– 0.004 (– 0.04)	0.085 (1.23)
$d_{t-1}^{1198} FR_{t-1}^i$	– 0.320** (– 7.28)	– 0.152 (– 1.17)	– 0.141 (– 1.34)	– 0.173* (– 1.71)	– 0.264** (– 2.35)	– 0.126 (– 1.34)	0.020 (0.31)
FRO_{t-1}^i		– 0.066 (– 1.16)	0.024 (0.41)	0.167** (2.50)	0.103** (2.37)	0.091* (1.81)	0.265** (5.54)
$d_{t-1}^{797} FRO_{t-1}^i$		0.177 (1.53)	0.062 (0.82)	0.238** (1.99)	0.335 (1.37)	0.176 (1.53)	0.099 (1.12)
$d_{t-1}^{1198} FRO_{t-1}^i$		0.069 (0.47)	0.019 (0.28)	– 0.092 (– 0.66)	– 0.349 (– 1.24)	– 0.230* (– 1.80)	– 0.166* (– 1.80)
US_{t-1}	0.166 (1.20)	0.094 (1.24)	0.027 (0.39)	0.145* (1.79)	0.226** (4.47)	0.228** (4.50)	0.167** (3.03)
$d_{t-1}^{797} US_{t-1}$	– 0.045 (– 0.28)	– 0.015 (– 0.10)	0.151 (1.35)	– 0.170 (– 0.90)	– 0.172 (– 0.55)	0.097 (0.53)	– 0.113 (– 0.73)
$d_{t-1}^{1198} US_{t-1}$	0.271** (3.34)	0.401* (1.78)	– 0.076 (– 0.67)	0.319 (1.54)	0.476 (1.36)	– 0.126 (– 0.64)	0.219 (1.41)
N	1302	1302	1302	1302	1302	1302	1302
Adj R^2	0.27	0.31	0.07	0.15	0.09	0.13	0.22

Table 7 (contd)

Effects during 7/97 - 10/98:							
FR_{t-1}^{I}	0.446**	0.280**	0.179**	0.147**	0.320**	0.039	0.070
FRO_{t-1}^{I}		0.111	0.086*	0.405**	0.438*	0.267**	0.365**
US_{t-1}	0.121	0.079	0.178**	– 0.025	0.054	0.324*	0.054
Effects during 11/98 - 12/99:							
FR_{t-1}^{I}	0.126**	0.128	0.038	– 0.027	0.056	– 0.087**	0.090**
FRO_{t-1}^{I}		0.180	0.105**	0.313**	0.089	0.037	0.199**
US_{t-1}	0.393**	0.479**	0.102	0.294**	0.530**	0.198**	0.273**

Table 8

Does the volatility of the Asian local market drive the volatility of fund prices in New York?

The first panel of this table reports slope coefficients and z-statistics (using Bollerslev-Wooldridge QML standard errors) for the variance equation from the following system:

$$FR_t^i = \alpha_0 + \alpha_1 LR_t^i + \alpha_2 RR_t^i + \alpha_3 US_t + \alpha_4 FR_{t-1}^i + \alpha_5 d_t^{797} + \alpha_6 d_t^{797} LR_t^i + \alpha_7 d_t^{797} RR_t^i + \alpha_8 d_t^{797} US_t + \alpha_9 d_t^{797} FR_{t-1}^i + \alpha_{10} d_t^{1198} + \alpha_{11} d_t^{1198} LR_t^i + \alpha_{12} d_t^{1198} RR_t^i + \alpha_{13} d_t^{1198} US_t + \alpha_{14} d_t^{1198} FR_{t-1}^i + \alpha_{15} LR_t^{i\,2} + \varepsilon_t^i$$

$$\varepsilon_t^i \sim N(0, h_t^i)$$

$$h_t^i = \gamma_0 + \gamma_1 \varepsilon_t^{i\,2} + \gamma_2 h_{t-1}^i + \gamma_3 d_t^{797} + \gamma_4 d_t^{1198} + \gamma_5 LR_t^{i\,2} + \gamma_6 d_t^{797} LR_t^{i\,2} + \gamma_7 d_t^{797} LR_t^{i\,2}$$

In the first column, the "portfolio of funds" is an equally weighted average of the country-fund returns; it is regressed on a constant, the US market return, an equally weighted portfolio of local market returns, its own lag, and interactions of these variables with the time dummies.

Constant term and coefficients on the lagged dependent variable are not reported. 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 and third panels report the totals of the coefficients on the squared local return during the periods when d_t^{797} equals 1 (ie $\gamma_5+\gamma_6$) and when d_t^{1198} equals 1 (ie $\gamma_5+\gamma_6+\gamma_7$.). 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	Korea funds	Taiwan funds	Thailand funds	Indonesia funds	Malaysia fund	Philippines fund
$\hat{\varepsilon}_t^{i\,2}$	0.106** (4.02)	0.043** (2.32)	0.203** (3.73)	0.077** (2.67)	0.131** (4.21)	0.113** (2.34)	0.103** (2.88)
h_{t-1}^i	0.542** (11.77)	0.776** (13.63)	0.502** (7.08)	0.666** (8.01)	0.717** (13.84)	0.396** (3.92)	0.596** (7.56)
d_t^{797}	0.00002** (2.47)	0.00004** (2.18)	0.00002 (0.94)	0.00007 (1.46)	0.00007** (2.18)	0.00019** (2.78)	– 0.00001 (– 0.83)
d_t^{1198}	– 0.00001 (– 0.92)	– 0.00004** (– 2.01)	– 0.00002 (– 0.85)	– 0.00001 (– 0.15)	0.00006 (1.24)	– 0.00011 (– 1.29)	0.00008** (3.34)
LR_t^{i2}	0.121** (2.89)	0.080** (2.59)	0.041 (0.77)	0.094** (2.88)	0.093* (1.68)	0.103 (0.60)	0.066** (2.37)
$d_t^{797} LR_t^{i2}$	– 0.004 (– 0.10)	– 0.037 (– 1.26)	0.001 (0.01)	0.056 (0.71)	– 0.067 (– 1.25)	– 0.028 (– 0.16)	0.218** (3.11)
$d_t^{1198} LR_t^{i2}$	0.054 (1.30)	– 0.014 (– 0.73)	0.016 (0.28)	– 0.102 (– 1.10)	– 0.039* (– 1.93)	0.773* (1.88)	– 0.248** (– 3.07)
N	1302	1302	1302	1302	1302	1302	1302
Adj R^2	0.47	0.48	0.34	0.28	0.29	0.24	0.30
Effects during 7/97 - 10/98:							
LR_t^{i2}	0.116**	0.043**	0.042	0.150	0.026**	0.075**	0.284**
Effects during 11/98 - 12/99:							
LR_t^{i2}	0.170**	0.029**	0.058	0.048	– 0.013	0.848**	0.036

Table 9

Does the volatility of fund prices in New York drive the volatility of the Asian local market?

The first panel of this table reports slope coefficients and z-statistics (using Bollerslev-Wooldridge QML standard errors) for the ***variance*** equation from the following system:

$$LR_t^i = \beta_0 + \beta_1 FR_{t-1}^i + \beta_2 FRO_{t-1}^i + \beta_3 US_{t-1} + \beta_4 LR_{t-1}^i$$
$$+ \beta_5 d_{t-1}^{797} + \beta_6 d_{t-1}^{797} FR_{t-1}^{\ i} + \beta_7 d_{t-1}^{797} FRO_{t-1}^i + \beta_8 d_{t-1}^{797} US_{t-1} + \beta_9 d_{t-1}^{797} LR_{t-1}^i$$
$$+ \beta_{10} d_{t-1}^{1198} + \beta_{11} d_{t-1}^{1198} FR_{t-1}^{\ i} + \beta_{12} d_{t-1}^{1198} FRO_{t-1}^i + \beta_{13} d_{t-1}^{1198} US_{t-1} + \beta_{14} d_{t-1}^{1198} LR_{t-1}^i$$
$$+ \beta_{15} FR_{t-1}^{i\ 2} + \eta_t^i$$
$$\eta_t^i \sim N(0, k_t^i)$$
$$k_t^i = \delta_0 + \delta_1 \eta_t^{i\,2} + \delta_2 k_{t-1}^i + \delta_3 d_{t-1}^{797} + \delta_4 d_{t-1}^{1198} + \delta_5 FR_{t-1}^{i\ 2} + \delta_6 d_{t-1}^{797} FR_{t-1}^{i\ 2} + \delta_7 d_{t-1}^{1198} FR_{t-1}^{i\ 2}$$

In the first column, the "portfolio of local returns" is an equally weighted average of the local dollar returns; it is regressed on a constant, the US market return, an equally weighted portfolio of fund-return residuals, its own lag, and interactions of these variables with the crisis dummy.

Constant term and coefficients on the lagged dependent variable are not reported. 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 and third panels report the totals of the coefficients on the squared local return during the periods when d_t^{797} equals 1 (ie $\delta_5+\delta_6$) and when d_t^{1198} equals 1 (ie $\delta_5+\delta_6+\delta_7$.). Significance levels are based on the F-statistic from a Wald test for the sum of the coefficients equalling zero.

Explanatory var.	Portfolio of returns	Korea loc return	Taiwan loc return	Thailand loc return	Indonesia loc return	Malaysia loc return	Philippines local return
$\hat{\varepsilon}_t^{i\,2}$	0.151** (11.58)	0.060** (3.08)	0.106** (3.36)	0.059** (3.09)	0.137** (3.90)	0.084** (4.47)	0.093** (3.07)
$h_{t-1}^{\ i}$	0.599** (36.72)	0.906** (42.05)	0.720** (11.05)	0.913** (39.54)	0.719** (12.96)	0.836** (27.28)	0.853** (18.13)
d_{t-1}^{797}	0.00003** (3.01)	– 0.00001 (– 1.12)	0.00000 (0.33)	0.00000 (0.30)	0.00009 (1.08)	0.00002 (0.95)	0.00004** (2.12)
d_{t-1}^{1198}	– 0.00007** (– 20.22)	0.00002* (1.69)	– 0.00001 (– 0.48)	0.00001 (0.75)	– 0.00002 (– 0.26)	0.00000 (– 0.07)	– 0.00004** (– 1.98)
FR_{t-1}^{i2}	0.002 (0.04)	0.009 (0.76)	0.024 (1.01)	0.008 (0.79)	0.032 (1.47)	0.016** (2.58)	0.012 (1.39)
$d_{t-1}^{797} FR_{t-1}^{i2}$	0.003 (0.04)	0.033* (1.90)	0.021 (0.60)	0.014 (1.12)	0.296** (2.91)	0.073 (1.11)	– 0.014 (– 1.26)
$d_{t-1}^{1198} FR_{t-1}^{i2}$	0.001 (0.08)	– 0.041 (– 1.58)	0.047 (1.14)	– 0.033 (– 1.54)	– 0.263** (– 2.45)	– 0.094 (– 1.39)	0.001 (0.06)
N	1302	1302	1302	1302	1302	1302	1302
Adj R^2	0.25	0.07	0.06	0.13	0.08	0.11	0.21
Effects during 7/97 - 10/98:							
FR_{t-1}^{i2}	0.005	0.042**	0.044	0.022*	0.328**	0.089	– 0.002
Effects during 11/98 - 12/99:							
FR_{t-1}^{i2}	0.005**	0.001	0.091**	– 0.011	0.066*	– 0.005**	– 0.001

Table 10

Summary statistics on monthly purchases of Asian equities

These tables present summary statistics on the monthly net purchases of equities by customers of State Street Bank and Trust Co., a large international securities custodian. Each monthly figure is the ratio of total purchases of equities from the specified country during that month to the country's average stock market capitalisation during the month, expressed in percentage points. Negative values indicate net sales.

	Mean	Std Deviation	Minimum	Maximum
Korea				
Full sample (1/95-9/99)	3.18	8.04	– 20.65	35.26
Pre-crisis (1/95-6/97)	2.84	3.42	– 4.17	12.15
Crisis (7/97-10/98)	7.06	13.42	– 6.13	35.26
Post-crisis (11/98-9/99)	0.74	8.56	– 20.65	14.31
Thailand				
Full sample (1/95-9/99)	3.05	5.36	– 7.68	20.53
Pre-crisis (1/95-6/97)	2.38	4.38	– 7.68	17.10
Crisis (7/97-10/98)	7.45	6.41	– 1.00	20.53
Post-crisis (11/98-9/99)	0.87	4.51	– 7.05	9.00
Indonesia				
Full sample (1/95-9/99)	3.56	5.94	– 8.77	23.24
Pre-crisis (1/95-6/97)	4.42	4.84	– 8.77	15.68
Crisis (7/97-10/98)	2.15	6.24	– 7.91	13.27
Post-crisis (11/98-9/99)	2.97	7.65	– 7.06	23.24
Malaysia				
Full sample (1/95-9/99)	1.31	4.61	– 12.15	13.10
Pre-crisis (1/95-6/97)	2.70	3.67	– 4.49	12.92
Crisis (7/97-10/98)	0.25	7.46	– 12.15	13.10
Post-crisis (11/98-9/99)	– 0.62	2.10	– 4.10	1.83
Philippines				
Full sample (1/95-9/99)	3.19	6.45	– 14.38	17.33
Pre-crisis (1/95-6/97)	5.24	4.39	– 1.69	17.33
Crisis (7/97-10/98)	5.14	6.93	– 3.61	15.16
Post-crisis (11/98-9/99)	– 2.46	6.51	– 14.38	6.76
Five-country average				
Full sample (1/95-9/99)	2.86	4.23	– 6.68	17.58
Pre-crisis (1/95-6/97)	3.51	2.84	– 1.11	11.01
Crisis (7/97-10/98)	4.41	5.95	– 2.34	17.58
Post-crisis (11/98-9/99)	0.30	4.12	– 6.68	5.73

Source: State Street; author's calculations.

Table 11

Does the Asian local market have more influence on fund prices in New York when US investors are buying Asian equities?

The first panel of this table reports slope coefficients and z-statistics (using Bollerslev-Wooldridge QML standard errors) for the system:

$$FR_t^i = \alpha_0 + \alpha_1 LR_t^i + \alpha_2 RR_t^i + \alpha_3 US_t + \alpha_4 FR_{t-1}^i + \alpha_5 IF_t^i + \alpha_6 IF_t^i LR_t^i + \alpha_7 IF_t^i RR_t^i + \alpha_8 IF_t^i US_t + \alpha_9 IF_t^i FR_{t-1}^i + \varepsilon_t^i$$

$$\varepsilon_t^i \sim N(0, h_t^i)$$

$$h_t^i = \gamma_0 + \gamma_1 \varepsilon_t^{i\,2} + \gamma_2 h_{t-1}^i + \gamma_3 IF_t^i + \gamma_4 LR_t^{i\,2} + \gamma_5 IF_t^i LR_t^{i\,2}$$

The inflow variable, IF_t^i, equals the net purchase of equities from country *i* by US investors during the corresponding month, scaled by the country's market capitalisation. Data for this variable for Taiwan were not available. In the first column, the "portfolio of funds" is an equally weighted average of the country-fund returns; it is regressed on a constant, the US market return, an equally weighted portfolio of local market returns, its own lag, and interactions of these variables with an average of the five countries' net-equity-purchase variables.

Constant term and coefficients on the lagged dependent variable are not reported. 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.

Explanatory variable	Portfolio of funds	Korea funds	Thailand funds	Indonesia funds	Malaysia fund	Philippines fund
Mean equation:						
IF_t^i	0.004 (0.56)	0.003 (0.35)	– 0.010 (– 0.98)	0.003 (0.38)	0.003 (0.28)	0.008 (1.05)
LR_t^i		0.603** (22.66)	0.440** (11.87)	0.297** (10.04)	0.431** (8.70)	0.510** (11.23)
$IF_t^i * LR_t^i$		– 0.898** (– 3.82)	– 1.504** (– 2.36)	0.752* (1.71)	– 1.932** (– 2.65)	– 0.194 (– 0.32)
RR_t^i	0.658** (18.90)	0.114** (2.74)	0.135** (2.22)	0.340** (5.09)	0.237** (4.16)	0.150** (2.85)
$IF_t^i * RR_t^i$	– 1.066* (– 1.93)	– 0.212 (– 0.82)	1.482 (1.64)	– 1.586 (– 1.53)	1.587* (1.90)	0.109
US_t	0.476** (11.28)	0.491** (8.56)	0.517** (6.99)	0.448** (5.50)	0.485** (7.81)	0.565** (7.72)
$IF_t^i * US_t$	0.108 (0.12)	0.521 (0.59)	1.052 (0.75)	0.341 (0.35)	– 0.358 (– 0.28)	– 1.139 (– 1.12)
Variance equation:						
$\hat{\varepsilon}_t^{i\,2}$	0.126** (3.88)	0.062** (2.56)	0.094** (3.30)	0.057** (3.69)	0.080 (1.59)	0.129** (2.95)
h_{t-1}^i	0.620** (10.42)	0.743** (15.71)	0.774** (16.60)	0.933** (45.62)	0.797** (12.70)	0.625** (9.96)
IF_t^i	0.00003 (0.58)	0.00009 (1.07)	0.00002 (0.30)	0.00002 (1.28)	0.00023 (1.51)	– 0.00012* (– 1.72)
$LR_t^{i\,2}$	0.151** (4.39)	0.076** (4.23)	0.099** (3.17)	0.007 (1.57)	0.116** (2.09)	0.199** (4.31)
$IF_t^i * LR_t^{i\,2}$	– 0.523** (– 2.54)	– 0.162** (– 2.24)	0.150 (0.44)	– 0.086** (– 2.52)	– 0.856** (– 2.04)	– 0.846** (– 2.63)
N	1236	1236	1236	1236	1236	1236
Adj R^2	0.37	0.42	0.25	0.25	0.19	0.27

Table 11 (contd)

Explanatory variable	Portfolio of funds	Korea funds	Thailand funds	Indonesia funds	Malaysia fund	Philippines fund
Effects when net purchases of Asian equities are at their average level:						
LR_t^I	0.628**	0.573**	0.395**	0.322**	0.411**	0.503**
RR_t^I		0.107**	0.180**	0.286**	0.254**	0.154**
US_t	0.479**	0.508**	0.549**	0.460**	0.481**	0.526**
$LR_t^{i\,2}$	0.136**	0.070**	0.104**	0.004	0.107**	0.170**
Effects when net purchases of Asian equities are one S.D. above their average level:						
LR_t^I	0.583**	0.503**	0.314**	0.368**	0.314**	0.491**
RR_t^I		0.091**	0.259**	0.190**	0.333**	0.160**
US_t	0.483**	0.549**	0.605**	0.480**	0.463**	0.457**
$LR_t^{i\,2}$	0.114**	0.058**	0.112**	– 0.001	0.064**	0.119**

Table 12

Does investor sentiment in New York have more influence on local Asian returns when US investors are buying Asian equities?

The first panel of this table reports slope coefficients and z-statistics (using Bollerslev-Wooldridge QML standard errors) for the system:

$$LR_t^i = \beta_0 + \beta_1 FR_{t-1}^i + \beta_2 FRO_{t-1}^i + \beta_3 US_{t-1} + \beta_4 LR_{t-1}^i + \beta_5 IF_{t-1}^i + \beta_6 IF_{t-1}^i FR_{t-1}^i + \beta_7 IF_{t-1}^i FRO_{t-1}^i + \beta_8 IF_{t-1}^i US_{t-1} + \beta_9 IF_{t-1}^i LR_{t-1}^i + \beta_{10} FR_{t-1}^{i\ 2} + \eta_t^i$$

$$\eta_t^i \sim N(0, k_t^i)$$

$$k_t^i = \delta_0 + \delta_1 \varepsilon_t^{i\,2} + \delta_2 h_{t-1}^i + \delta_3 IF_{t-1}^i + \delta_4 LR_t^{i\,2} + \delta_5 IF_{t-1}^i LR_t^{i\,2}$$

The inflow variable, IF_t^i, equals the net purchase of equities from country *i* by US investors during the corresponding month, scaled by the country's market capitalisation. In the first column, the "portfolio of returns" is an equally weighted average of the local market returns returns; it is regressed on a constant, the US market return, an equally weighted portfolio of fund returns, its own lag, and interactions of these variables with an average of the five countries' net-equity-purchase variables.

Constant term and coefficients on the lagged dependent variable are not reported. 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.

Explanatory variable	Portfolio of returns	Korean loc return	Thailand loc return	Indonesia loc return	Malaysia loc return	Philippines loc return
Mean equation:						
IF_{t-1}^i	0.023** (3.22)	0.024* (1.92)	0.016 (1.32)	0.018 (0.99)	0.035** (3.44)	0.017** (2.56)
FR_{t-1}^i		0.142** (3.23)	0.058 (1.37)	0.241** (4.16)	– 0.002 (– 0.08)	0.037 (1.32)
$IF_{t-1}^i * FR_{t-1}^i$		– 0.145 (– 0.20)	1.435* (1.87)	– 0.435 (– 0.66)	0.745 (1.22)	– 0.388 (– 0.90)
FRO_{t-1}^i	0.213** (5.12)	0.042 (0.88)	0.191** (3.21)	0.442** (2.37)	0.064 (1.42)	0.289** (7.16)
$IF_{t-1}^i * FRO_{t-1}^i$	– 0.744 (– 0.86)	0.428 (0.57)	1.403 (1.46)	– 1.070 (– 0.27)	2.951** (2.20)	– 0.318 (– 0.53)
US_{t-1}	0.293** (6.30)	0.173** (2.53)	0.198** (2.40)	0.099 (0.70)	0.287** (5.51)	0.191** (3.86)
$IF_{t-1}^i * US_{t-1}$	– 2.128** (– 2.34)	– 1.508 (– 1.16)	– 1.904 (– 1.23)	1.973 (0.66)	– 2.086* (– 1.69)	0.304 (0.37)
Variance equation:						
$\hat{\varepsilon}_t^{i\,2}$	0.061** (3.55)	0.044** (2.76)	0.041** (2.34)	0.270** (2.60)	0.113** (4.35)	0.096** (4.08)
h_{t-1}^i	0.915** (43.51)	0.932** (57.98)	0.951** (61.96)	0.550** (3.69)	0.889** (42.18)	0.900** (38.26)
IF_{t-1}^i	– 0.00001 (– 0.46)	– 0.00002 (– 0.38)	– 0.00002 (– 0.47)	– 0.00096** (– 2.71)	– 0.00005 (– 1.40)	0.00001 (0.64)
$FR_{t-1}^{i\,2}$	0.020** (2.42)	0.025** (3.47)	0.008 (1.42)	0.093 (1.38)	0.000 (0.10)	0.003 (0.89)
$IF_{t-1}^i * FR_{t-1}^{i\,2}$	– 0.128 (– 1.06)	0.017 (0.13)	– 0.013 (– 0.13)	0.005 (0.00)	0.087 (1.07)	– 0.077 (– 1.10)
N	1236	1236	1236	1236	1236	1236
Adj R^2	0.20	0.06	0.13	0.09	0.09	0.19

Table 12 (contd)

Explanatory variable	Portfolio of returns	Korean loc return	Thailand loc return	Indonesia loc return	Malaysia loc return	Philippines loc return
Effects when net purchases of Asian equities are at their average level:						
FR_{t-1}^{i}	0.192**	0.137**	0.101**	0.226**	0.006	0.023
FRO_{t-1}^{i}		0.056	0.233**	0.406**	0.095**	0.278**
US_{t-1}	0.232**	0.123*	0.140**	0.167*	0.265**	0.201**
$FR_{t-1}^{i\,2}$	0.016**	0.026**	0.008	0.093*	0.001	0.001
Effects when net purchases of Asian equities are one S.D. above their average level:						
FR_{t-1}^{i}	0.161**	0.125*	0.178**	0.200**	0.043	0.000
FRO_{t-1}^{i}		0.089	0.308**	0.341	0.243**	0.259**
US_{t-1}	0.144**	0.006	0.038	0.285	0.161**	0.219**
$FR_{t-1}^{i\,2}$	0.011*	0.027*	0.007	0.093	0.005	– 0.004

Comments on Benjamin H Cohen and Eli M Remolona's paper "Information flows during the Asian crisis: evidence from closed-end funds"

Tatsuya Yonetani, Bank of Japan

I am very pleased to be here today and to comment on this very interesting and constructive paper dealing with information flows during the international financial crisis. In my view, the Cohen and Remolona paper is an excellent example of the insights empirical research gives practitioners and policy makers into policy questions regarding market design and regulations. Specifically, the paper examines global flows of information before, during and after the Asian crisis and offers important insights into the debate over the cause of the financial crisis and activities of foreign investors such as hedge funds. I will not go into the content of the paper in detail, but would like to point out some of the most interesting findings.

First, the paper focuses on the direction of information flows with respect to financial market returns in Asian markets; did information flow from the domestic markets to the US market, or vice versa?

As the paper points out, this question is a fundamental one in understanding the Asian financial crisis because, depending on the answer, different lessons could be derived from the experience regarding the cause of the financial crisis.

The finding of the paper in this respect is that while information flows between local and US markets tended to be roughly evenly balanced before the crisis, US market returns assumed a more important role during the crisis. The paper also finds that the shift in causation between the US and Asia reflected US market sentiment playing a greater role than the news that became known during US trading hours.

These findings are very interesting and I am interested to know what exactly they mean. The authors conclude that they reflected changes in investor sentiment, but what transmission mechanisms can be identified and through which changes does US investor sentiment have a material effect in determining emerging-market returns?

In my view, there seem to be several explanations to the mechanisms. One explanation emphasizes information linkage. Connections between US closed-fund returns and local market returns occur through information. If both markets share some common factor regarding risk and return, then fund returns in one market have an impact on those in the other market. In this explanation, the market doesn't need to be connected with other markets in a transactional sense. A shock may be transmitted from the US market to Asian markets, even though investors trading in the former might be completely different from those in the latter. The only thing needed is some shared some common factor regarding risk and return.

Regarding information linkage, the paper provides us with a very interesting insight, namely that the common factor reflected US investors' sentiment toward specific markets, and not merely the news which was known during US trading hours. This seems to imply that global contagion spreads from industrial countries to emerging economies only when investors recognize events or news as important factors to be considered in specific risk-return relationships.

An alternative explanation to the mechanisms producing contagion and amplifying market dynamics could be the effect of portfolio rebalancing. From this point of view, contagion occurs through trading for portfolio rebalancing purposes. A typical example is the repatriation of funds from emerging markets by investors in industrial countries. Actually, it is said that some signs of such behaviour were observed in some Asian countries in the first half of this year, which was affected by US stock market corrections. Such behaviour can perhaps, to some extent, be explained by the decreasing willingness of investors to shoulder credit risk because of losses incurred by US stock market corrections.

In this context, findings in the paper might be interpreted as follows: Investors rebalanced their portfolios because returns in other markets had a direct effect on their risk tolerance. Movements in US markets had such an effect on US-based closed-fund investors, but not so on local market investors. Stronger interconnection between US-based closed-funds and local funds during the crisis might suggest the existence of international investors who invested in both US-based closed-funds

and local funds. I think such a supposition is plausible, because such investment in different types of funds, in which the underlying instrument is the same but liquidity is different, could contribute to hedging or arbitraging purposes.

Supposing that a shock was strongly transmitted between the US market and Asian markets through information linkage or through rebalancing effects during the crisis, why was the direction of information flow from US market returns to local markets returns more strongly transmitted and not vice versa? Is it because mature-market investors have better information about emerging markets than local market investors? Or is it because US market returns have a bigger effect on the risk tolerance of international investors than local market returns? I think this is a very interesting question on which future research in this area might focus.

Another interesting finding in the Cohen and Remolona paper concerns market sentiment and capital flows between the US and Asian markets. The paper suggests US investors tended to be contrarians in their portfolio activities vis-à-vis Asia: they purchased Asian equities just when their opinions differed most from investors in the local markets.

As I see it, this finding is actually confirmed by trends in US capital flow data and is very stimulating in understanding the market dynamics during the crisis. According to capital movement statistics by the US Treasury Department as shown in Chart 1, US investors seemed to purchase Asian stocks at low prices even during the Asian crisis and sold them at higher prices to take profits in the latter half of 1999.

In contrast, Japanese investors exhibited different investment behaviour, as shown in Chart 2. It was not until 1999 that net equity investment from Japan to Asian countries turned to a positive figure. These results might suggest that not only local investors but also Japanese investors pursued positive feedback strategies toward Asian equities during the crisis, while US investors followed negative feedback strategies.

What accounts for such a difference between the two types of investors?

Does this mean that Asian investors, including Japanese investors, were so greatly affected by local news that they could not make objective judgement about investment in Asian equities? Or does this difference stem from that of different time horizons? This point is interesting and could be related to the issue regarding information asymmetry between US investors and local investors.

In my view, the debate over investor strategies as to whether positive feedback or negative feedback and the impact on the market is particularly important, in the sense that it could be a key aspect of market dynamics during the crisis. If positive feedback investors become dominant in the market when market strains emerge, they tend to close out their long positions even though there may be strong suspicion that prices have overshot only temporarily. Such herding behaviour exacerbates market pressures. Typically, it is said that such a mechanism occurred in autumn 1998. However, the paper suggests that US-based international investors should perhaps not always be regarded as the culprits of the Asian crisis, whose sharp outflow of portfolio investments brought about declines in asset prices. In fact, they could even be regarded as having helped market prices recover in the healing process after the crisis.

It is said that recently index-based investment style has become more prevalent and having more of an impact on the market. Such investors are typical positive feedback ones and I think the analytical framework in the paper may be applied to analyse such changes in investment style in the market.

In closing, once again I would like to say that many of the findings in the paper contain stimulating points which should be taken into account when considering policy issues regarding market design and regulations. I hope such empirical studies as these will further contribute to such policy issues in the future.

Thank you for your kind attention.

Comments on Benjamin H Cohen and Eli M Remolona's paper "Information flows during the Asian crisis: evidence from closed-end funds"

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The recent Asian crisis has generated a heated debate regarding the underlying causes and the appropriate policy response. Cohen and Remolona provide a very nice and succinct summary of the literature, outlining opposing positions classifying the crisis as either home grown or driven by developments in international financial markets. In the course of weighing the evidence they review relevant data on the direction of foreign capital flows and the premia on US closed-end Asian equity funds. Although such data is useful, they note it has inherent limitations. In particular, it is at best available at a weekly interval rendering direct analysis of the dynamics of the information flow during the crisis impossible. Being able to study the markets at a daily frequency and investigating whether return relevant information has its origin in Asia and is flowing from Asia to foreign markets or vice versa is of interest for a number of reasons. It permits a more direct examination of the dynamics of the crisis and the role exerted by different factors. For example, it may shed light on whether foreign "speculators" were to blame for the development and what may be achieved by imposing restrictions on international capital flows. It would thus also speak indirectly to the desirability of including private investors in debt workouts and the appropriate role of IMF.

Unfortunately, data that allow us to explore this issue directly is not readily available since the stocks Asian equities typically are not traded outside of the local markets. Cohen and Remolona suggest an interesting way around this problem. They analyse the daily interaction between returns on local Asian equity markets and US closed-end funds investing in these Asian equity markets. Although the net asset value of the stocks underlying the fund is not available daily, the market price of the fund is. Comparing the associated daily fund returns with the daily Asian equity-index returns provides direct evidence on the relative valuation of these assets from a US versus a local perspective.

The above observation motivates the regression-based analysis in the remainder of their paper. The comments below focus on methodological aspect of their approach. My main concern is that the explored regressions are hard to interpret and fail to fully exploit the lack of overlap between the trading in the local Asian and the US market. To illustrate my point it is convenient to consider a stylised framework. Assume first that the portfolio of stocks underlying the US traded closed-end fund is identical to the basket making up the local Asian equity index so that the returns are based on the same underlying assets, and investors may purchase the fund and stock index freely at no transaction costs. Second, assume that the returns are uncorrelated and the expected daily mean returns are small relative to the return innovations. These characteristics are broadly consistent with the hypothesis of an efficient market, although we may anticipate positive autocorrelation in the index returns due to nonsynchroneous trading effects. However, one may readily control for such features in practice. Third, let the calendar day be split into two consecutive segments, the Asian trading day followed by the US trading day. For simplicity, we assume no overlap and no separation between the two trading periods. Consequently, the close-to-close (CC) fund return, $R_t^F(CC)$, is composed of two distinct uncorrelated return innovations, ε_t^F and ε_t^L. Likewise, the close-to-close local return, $R_t^L(CC)$, consists of two uncorrelated components, ε_t^L and ε_{t-1}^F. In contrast, note that the corresponding open-to-close (OC) returns are $R_t^F(OC) = \varepsilon_t^F$ and $R_t^L(OC) = \varepsilon_t^L$. We also stipulate constant return variances, $Var(\varepsilon_t^F) = \Phi_F^2$ and $Var(\varepsilon_t^L) = \Phi_L^2$.

A stylised representation of the Cohen and Remolona regressions take the form,

$$R_t^F(CC) = a_0 + a_1 R_t^L(CC) + u_t^F, \quad (1)$$

and

$$R_t^L(CC) = b_0 + b_1 R_{t-1}^F(CC) + u_t^L, \quad (2)$$

Exploiting the decomposition of the close-to-close returns, we may rewrite (1) as

$$\varepsilon_t^L = a_0 + a_1 (\varepsilon_t^L + \varepsilon_{t-1}^F) + (u_t^F - \varepsilon_t^F), \quad (3)$$

where the "error" term, $u_t^F - \varepsilon_t^F$, is uncorrelated with the "regressor," $\varepsilon_t^L + \varepsilon_{t-1}^F$, while the dependent variable, ε_t^L, is identical to one component of the regressor and orthogonal to the other, ε_{t-1}^F. Consequently, equation (1) may be interpreted as an "error-in-variables" regression, where the open-to-close local Asian index return is regressed upon a noisy version of itself. If the second component was not included in the regressor, we would trivially have an asymptotic regression coefficient of unity, i.e., plim $a_1 = 1$. Given the "error-in-variables" representation, standard results instead imply,

$$\text{plim } a_1 = 1 - [\Phi_F^2 / (\Phi_L^2 + \Phi_F^2)]. \quad (4)$$

Equation (4) constrains a_1 to the unit interval. Moreover, a_1 increases with the size of the return innovations during local Asian trading relative to US trading. This suggests a simple interpretation of shifts in a_1 across subsamples: A declining a_1 implies that relatively more return relevant information is generated during US trading hours and vice versa. Similar arguments apply to equation (2). We have,

$$\text{plim } b_1 = 1 - [\Phi_L^2 / (\Phi_F^2 + \Phi_L^2)]. \quad (5)$$

Within this stylised setting, we thus have plim $(a_1 + b_1) = 1$, which reinforces the interpretation of the coefficients as representing shares of return relevant information generated in the respective trading hours. These findings suggest the following interpretation of the evidence in the paper. First, the coefficients corresponding to a_1 are almost universally higher than those corresponding to b_1, implying that the local Asian business hours generate the majority of the return relevant information for the Asian stocks. The higher regression R^2 of the specifications corresponding to equation (1) relative to (2) (Table 5 versus Table 6 in the paper) is also consistent with this view. Second, the drop in a_1 and increase in b_1 during the crisis period point to a relative elevation in the role of the US market segment during the crisis itself. These findings support the discussion in the paper.

Unfortunately, the formal justification behind these interpretations break down in the representations where additional variables, correlated with the above return innovations, are introduced into the system. Because the specifications include indicators observed simultaneously with both the local return (regional Asian market returns) and fund returns (US market index), the interpretation is confounded by complicated and likely time-varying correlation effects that are hard to assess within an "error-in-variables" style regression. This is further accentuated if one uses close-to-close returns for the auxiliary indices as they span both the Asian and US trading periods, and hence generally will be correlated with both Asian and fund return innovations. In particular, the direct interpretation of the relative size of the coefficients is lost and the estimates no longer cumulate to a meaningful measure of overall significance. Confirming this observation, the coefficients corresponding to a_1 and b_1 aggregate to less than unity -- slightly so in the pre-crisis period but much so during the crisis itself. Rather than trying to decipher the interactions between the parameter estimates in this setting complicated by the correlations induced by the overlap between close-to-close returns, I encourage the authors to explore an alternative set of regressions that avoid the overlap between return components among the regressors and thus are more readily interpretable. The only additional requirement is access to daily opening prices as well as closing prices. For example, consider

$$R_t^F(CO) = c_0 + c_1 R_t^L(OC) + c_2 RR_t(OC) + v_{1,t}^F, \quad (6a)$$

$$R_t^F(OC) = d_0 + d_1 R_t^L(OC) + d_2 US_t(OC) + v_{2,t}^F, \quad (6b)$$

$$R_t^F(CC) = e_0 + e_1 R_t^L(OC) + e_2 R_{t-1}^F(OC) + v_{3,t}^F. \quad (6c)$$

Notice that equation (6a) relates the fund return to the local Asian return over the period where only the Asian markets are trading. Hence, it checks whether the fund opening price incorporates the return innovation from the Asian market one-for-one ($c_1 = 1$). Some discrepancy may also be found if the assets held by the fund differ systematically from those in the local market index. As such, this serves as a useful control. In addition, one may gauge whether the other regional Asian stock indices impact the pricing of the fund beyond the effect already reflected in the local market ($c_2 > 0$). Equation (6b) studies whether there is a delayed reaction or systematic spill-over in sentiment from Asia to US trading in Asian stocks ($d_1 > 0$). Here, I have also included the contemporaneous US return to check for a direct relation between the US market and the valuation of the local Asian assets. Finally, equation (6c) relates the close-to-close fund return to the local Asian open-to-close return, where we may test $e_1 = 1$ without worrying about an error-in-variables problem. For illustration, I have also included the lagged fund return to control for autocorrelation due to nonsynchroneous trading, $e_2 = 0$. This type of specification is much easier to deal with econometrically, and the associated interpretation

of the estimates is more straightforward. Furthermore, modifications of equation (6a-c) that focus on alternative variables or controls are readily constructed.

Cohen and Remolona also study the volatility dynamics of the return series. The spirit of my comments also applies to this analysis. They base the analysis on close-to-close returns that potentially obscure the underlying relationships and certainly render the interpretation of the coefficients much more difficult than necessary. There is a well-established literature on volatility spill-overs that carefully calibrate and standardise non-overlapping return and volatility component in a manner that preserve the interpretation of standard volatility persistence measures from the daily univariate GARCH literature, rendering both marginal coefficients and cumulative effects meaningful. This is simply not attainable with the complex correlation structures that is induced among the various return components generated by overlapping close-to-close returns. Good illustrations of such procedures are provided in Engle, Ito and Lin (1990, Econometrica) and Hamao, Masulis and Ng (1990, Review of Financial Studies).

In conclusion, I find the paper both insightful and stimulating. It provides an excellent introduction to the crisis debate and points to an interesting set of data that may help us address questions directly related to the key issues. They establish that flight by foreign investors was not the driving force in the market collapse. The analysis also suggests that the US traded Asian funds were more important factors in the return dynamics during the crisis than either before or afterwards, and that the US domestic market in turn became more critical for the returns on the US based Asian country funds. This points towards an increased importance of the US market sentiment during the crisis. My more critical comments are motivated by the desire to see the available data exploited to the fullest so that the results are further robustified and the parameter estimates rendered more directly interpretable.