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 US and Asia reflected a greater role for US market sentiment, rather than for the news that became known during US trading hours.

Contents

1.   Introduction

Did the financial turmoil that affected many emerging economies in the middle and late 1990s stem primarily from developments within those economies or from events in financial markets in the industrial countries? 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. Wolf (1998) comments that whatever the policy crimes, these "hardly justify the enormity of the punishment." 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. Krugman (1998b) explains the severity and spread of the crisis by likening it to a bank run. 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.

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 US that same day. Similarly, the information incorporated in a day's closed-end fund trading is fully available for the next day's trade in Asia. 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 et al (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 programme 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

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return during the crisis period. This suggests that the shift in causation between the US 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 amounts 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 et al (1999), who find that foreign investors in the Korean equity market followed momentum (positive feedback) strategies before the crisis and contrarian (negative feedback) strategies during the crisis.

The next section reviews the debate about the direction of information flows before, during and after the Asian crisis. Section 3 examines characteristics of closed-end funds, including country funds, and discusses how they might shed light on the information flow debate. Section 4 describes the funds and local returns used in this study and discusses the behaviour of the discount to NAV over the period studied. Section 5 presents results on spillovers of the level of returns before, during and after the crisis, while Section 6 examines volatility spillovers. Section 7 investigates whether changes in US investors' holdings of Asian equities were associated with shifts in market sentiment across investor groups, using the relationship between local and fund returns as an indicator of these differences in sentiment. Section 8 concludes.

2.   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 $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.[1] 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. 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 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.[2] Brown et al (1998), however, estimate the currency positions of 10 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 Section 7 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 et al 1999)).

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[1] See Moreno et al (1998) for a narrative of the crisis. They also offer an explanation based on Krugman (1998) and McKinnon and Pill (1998).

[2] See "Highwaymen of the Global Economy," *Wall Street Journal*, 23 September 1997.

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.

3. 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 et al (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 et al (1991), note that a fund and its component stocks are likely to be held by different clienteles of investors. Specifically, Lee et al 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 et al 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.

4.   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 10 funds from six countries (Table 2).

Six of the 10 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 10 funds, there were times during the sample period when it sold at a premium and times when it sold at a discount. Premia tended to be closely correlated for the countries for which two funds are observed, suggesting that investor sentiment specific to 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).[3] 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

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[3]   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 NAV, even when the price is below the NAV (in which case the term "discount" will occasionally be used as well).

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 period". This covers the time from the floating of the Thai baht on 2 July 1997 to the stabilisation of markets in the course of October 1998, and thus corresponds roughly to the most acute phase of the crisis in terms of economic developments in the region itself.[4]

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 10 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 14 months following October 1998 were lower than during the crisis period for the Korean, Indonesian and Philippine funds. The premium on the Malaysia 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 (1996) 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

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[4]   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).

Taiwanese market, the wider discount for Taiwan may instead have indicated an increase in the risk premium demanded by US investors for Taiwanese assets.

5. 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.

5.1 Impact of Asian local returns on US country funds

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

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

(1)

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

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

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.[5] 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 to the end of the sample.

d_t^{1198}: A dummy variable taking the value one from 1 November 1998 to 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 et al (1995) and Bodurtha et al (1995), who find that US-based country fund returns reflect both US market returns and home market returns. The regional factor allows for the possibility of contagion effects. US investors might take information from a regional return into account when pricing the country fund, even if the regional return has not yet been incorporated (or 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 impact of autocorrelation in the country fund returns as far 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 6.

- 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)

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[5] 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 10 issues.

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% significance level) for each fund, confirming the findings of Diwan et al (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 United States and local investors in Asia, a divergence that diminished sharply in the aftermath of the crisis for the other four countries studied.

5.2 Impact of US sentiment on Asian local returns

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

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

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

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

(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 present 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.

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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.

5.3   Summary

A number of stylised facts can be drawn from the results in the previous two subsections. 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.

6. 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 to 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 transmission 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.

7. 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 few 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:

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

(3)

and

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

(4)
$$\eta_t^i \sim N(0, k_t^i)$$
$$k_t^i = \delta_0 + \delta_1 \varepsilon_t^{i~2} + \delta_2 h_{t-1}^i + \delta_3 IF_{t-1}^i + \delta_4 LR_t^{i~2} + \delta_5 IF_{t-1}^i LR_t^{i~2}$$

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" upwards 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.

8.   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 sell-off of Asian securities during the 1997–98 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-crisis times tended to be more or less well-correlated with the S&P 500 index, decoupled 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.

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Graph 1a
Components of net portfolio investment (USD millions): Korea
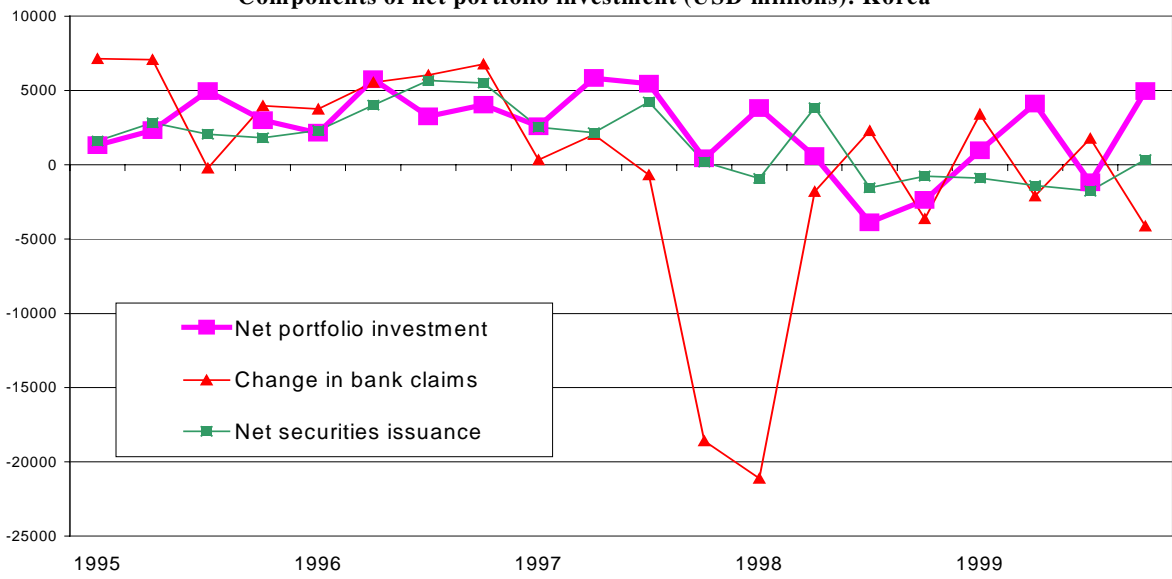
Graph 1b
Components of net portfolio investment (USD millions): Thailand
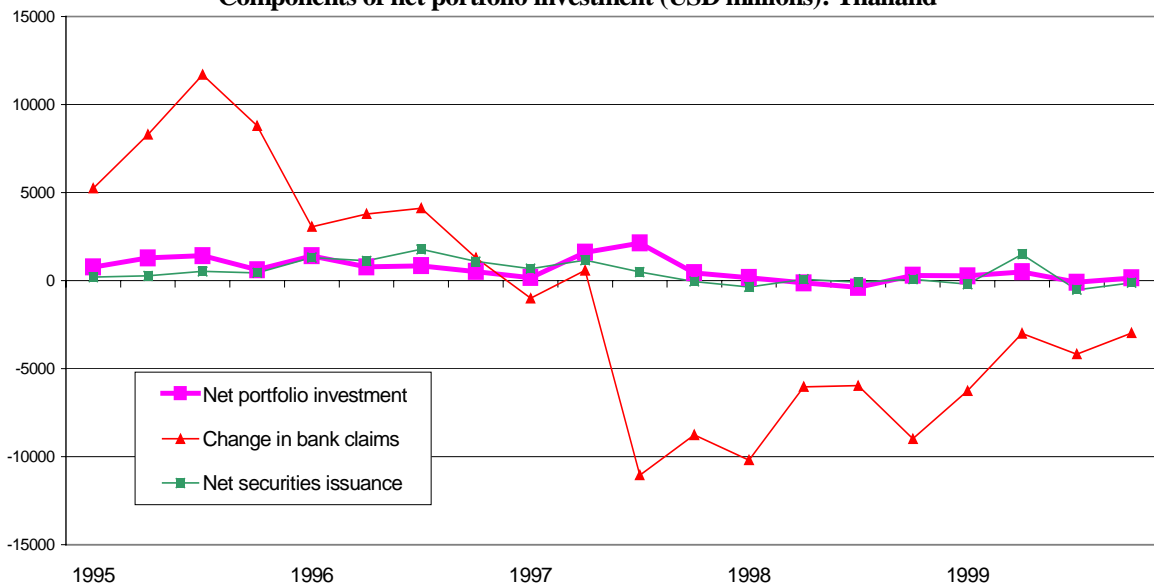
Graph 1c
Components of net portfolio investment (USD millions): Philippines
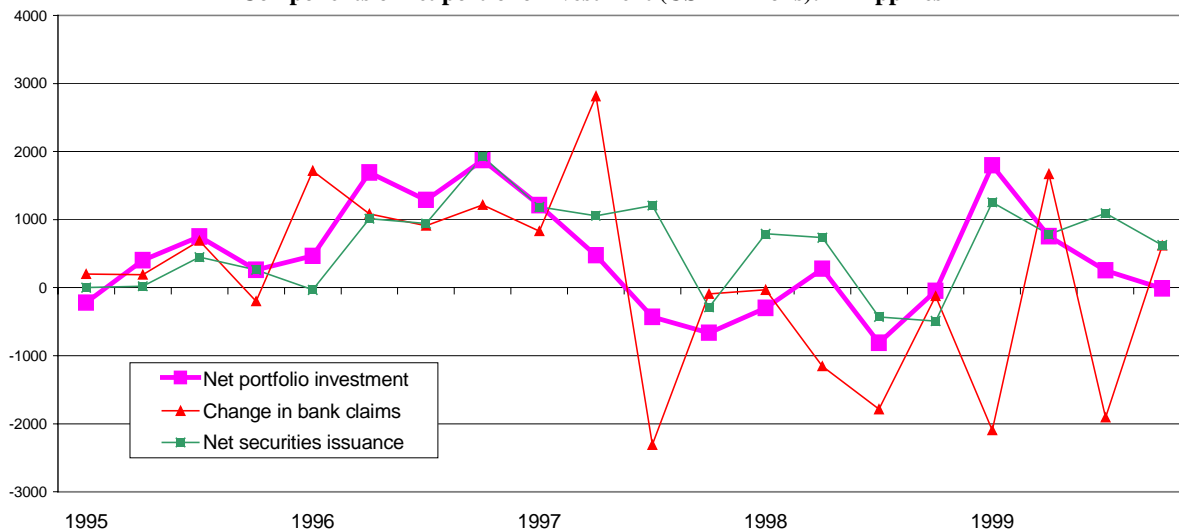
Sources (all graphs): IMF; BIS.

Graph 2a
Banks and equity investors compared: Korea

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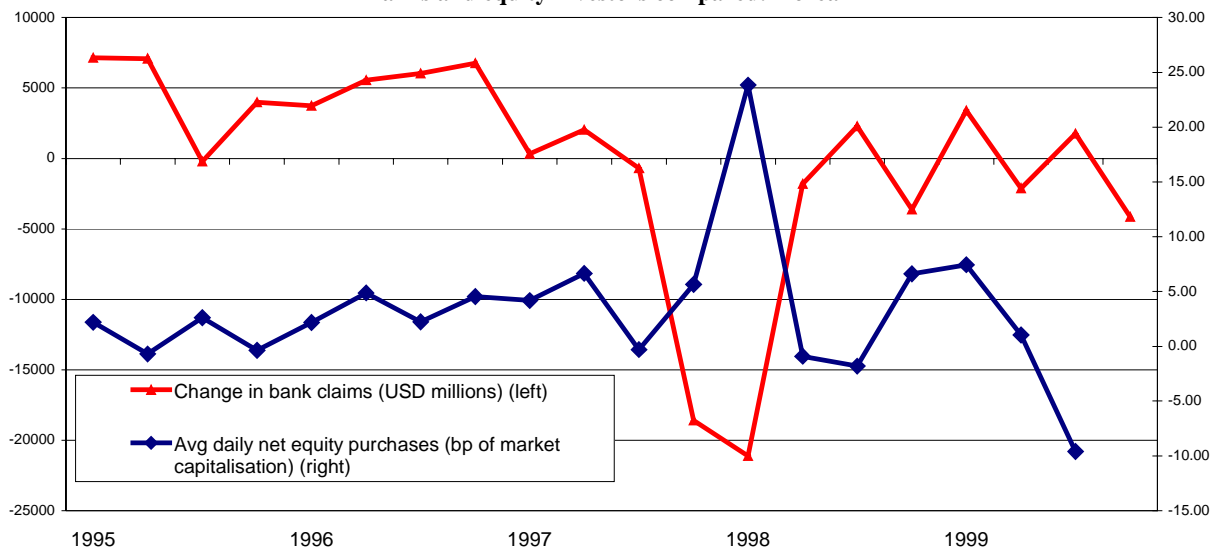
Graph 2b
Banks and equity investors compared: Thailand

Change in bank claims (USD millions) (left)

Average daily net equity purchases (bp of market capitalisation) (right)
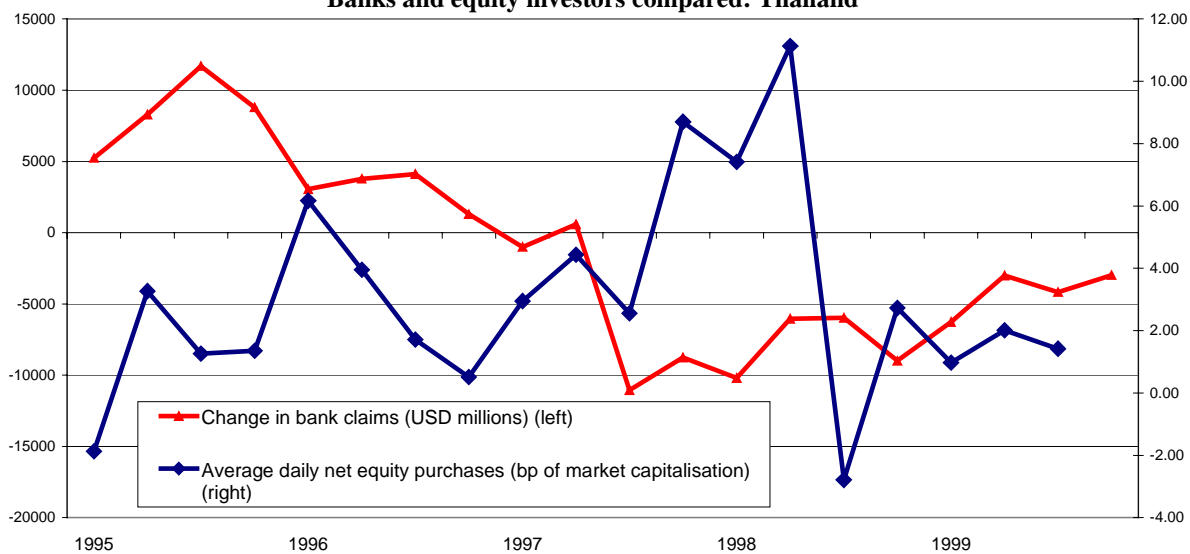
Graph 2c
Banks and equity investors comapred: Indonesia

Change in bank claims (USD millions) (left)

Avg daily net equity purchases (bp of market capitalisation) (right)

20
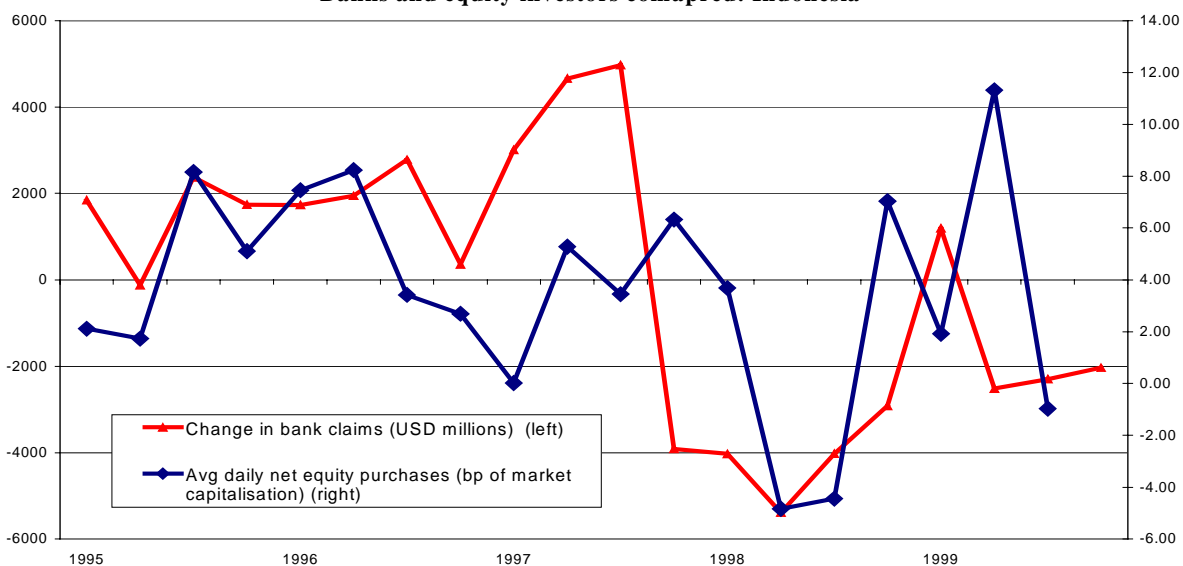
Graph 2d
Banks and equity investors compared: Malaysia
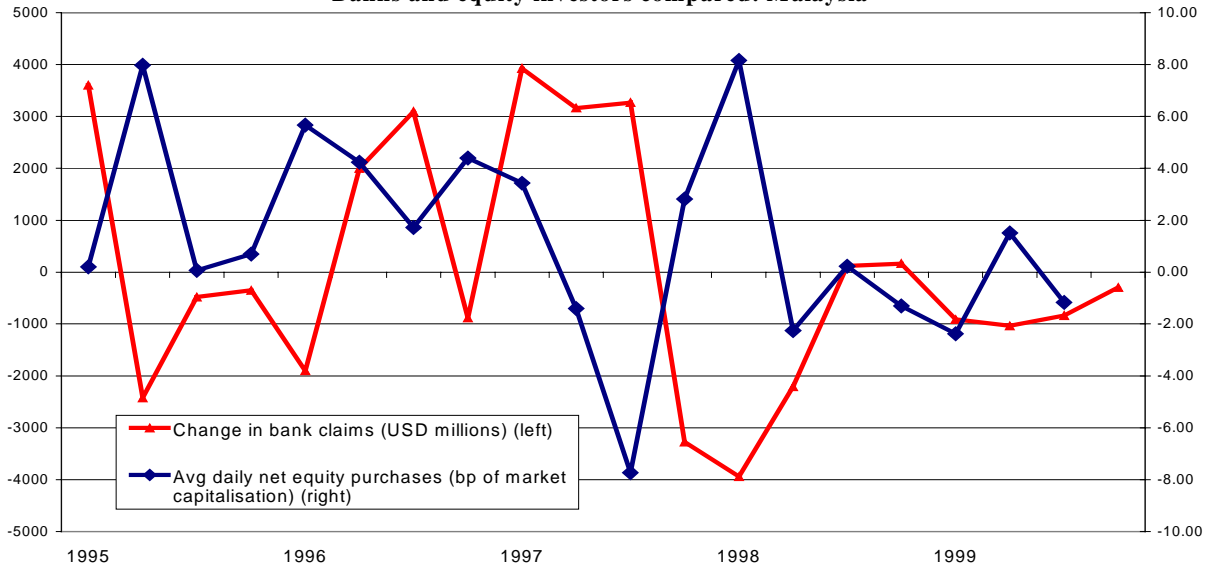
Graph 2e
Banks and equity investors compared: Philippines
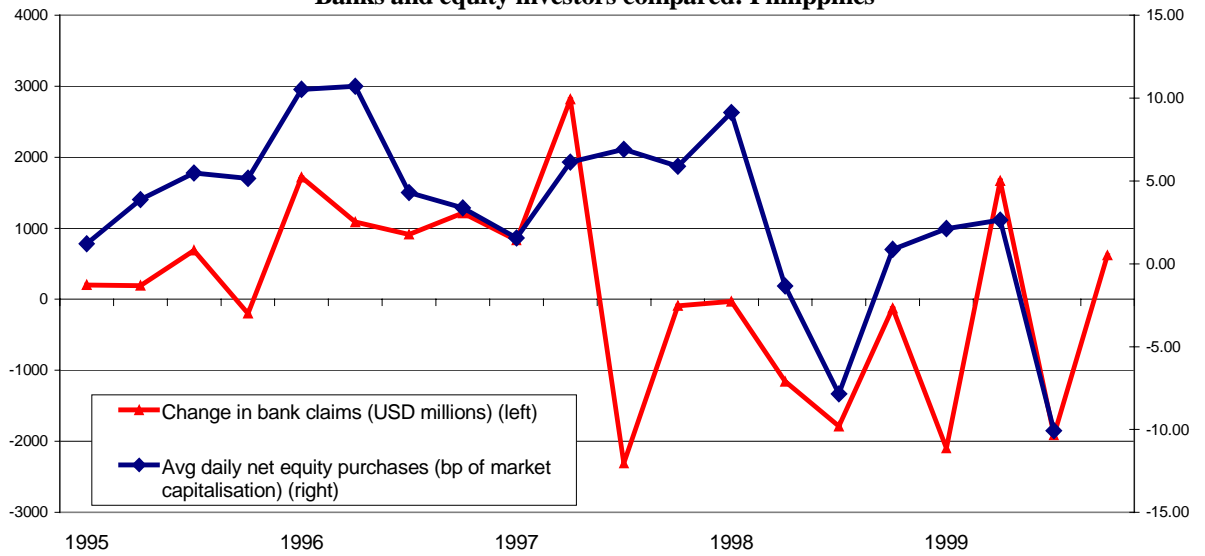
Sources (all graphs): BIS; State Street.

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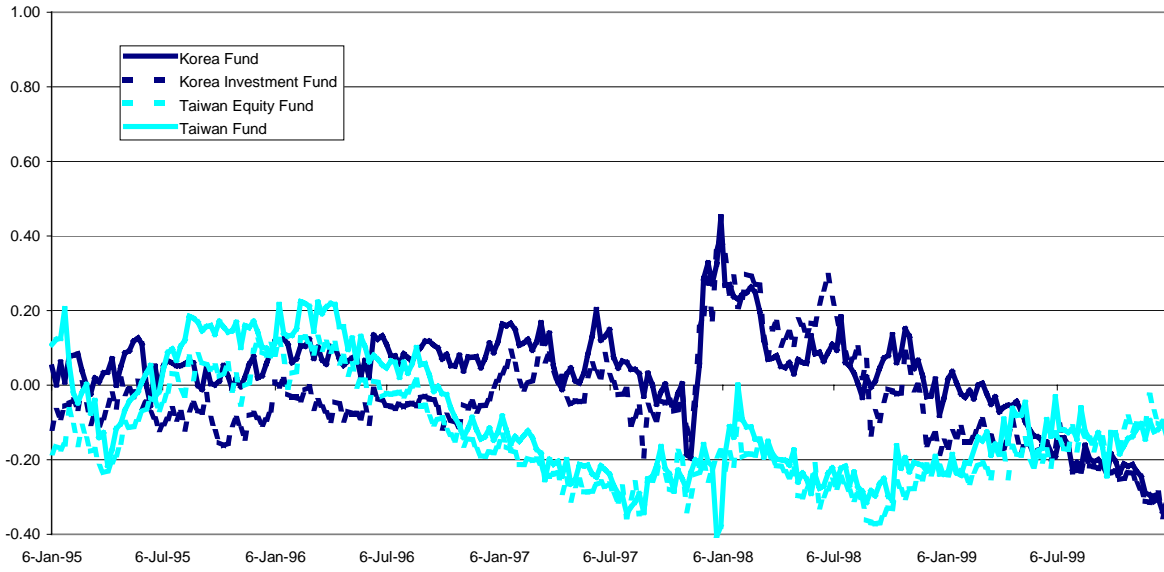
Graph 3b
Premium of price over net asset value (cont.)

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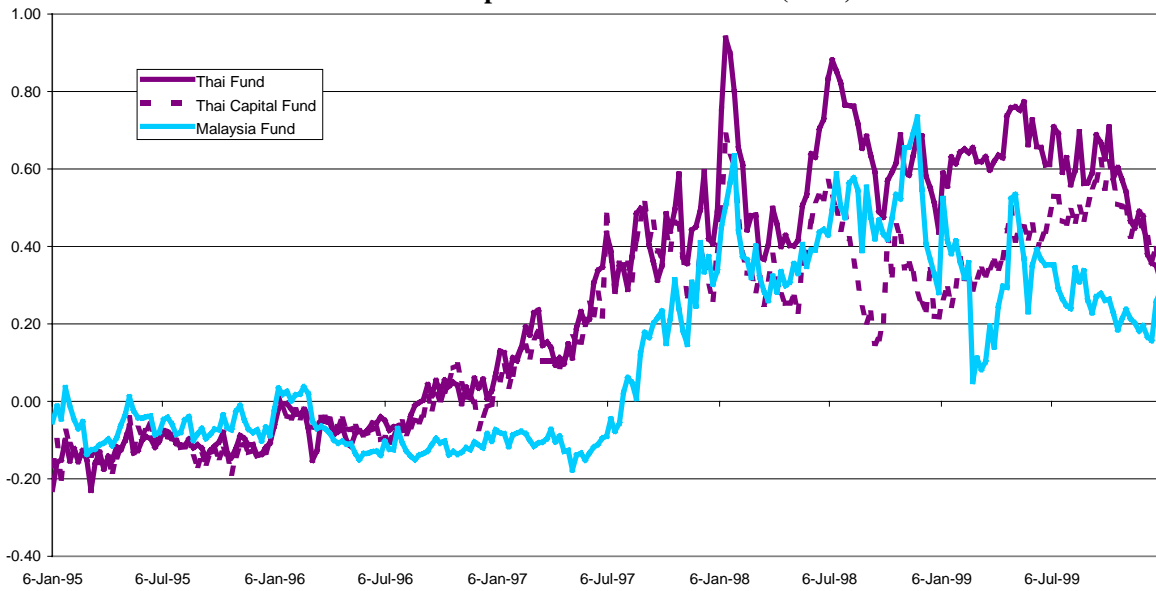
Graph 3c
Premium of price over net asset value (cont.)
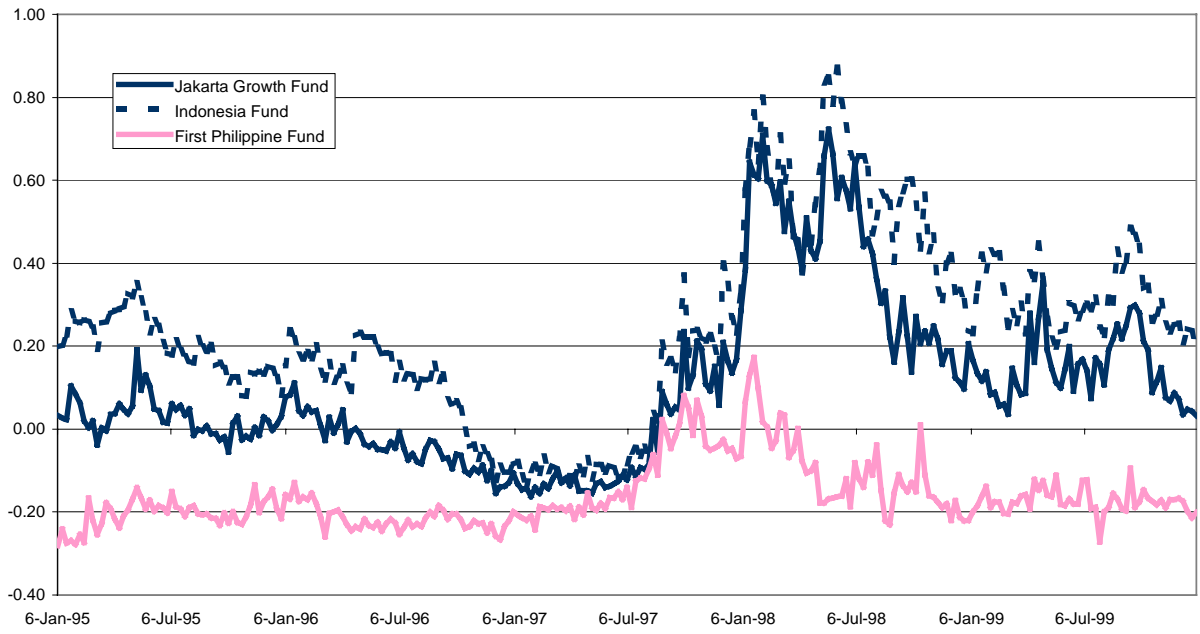
Graph 4a
Effect of local market return on fund return
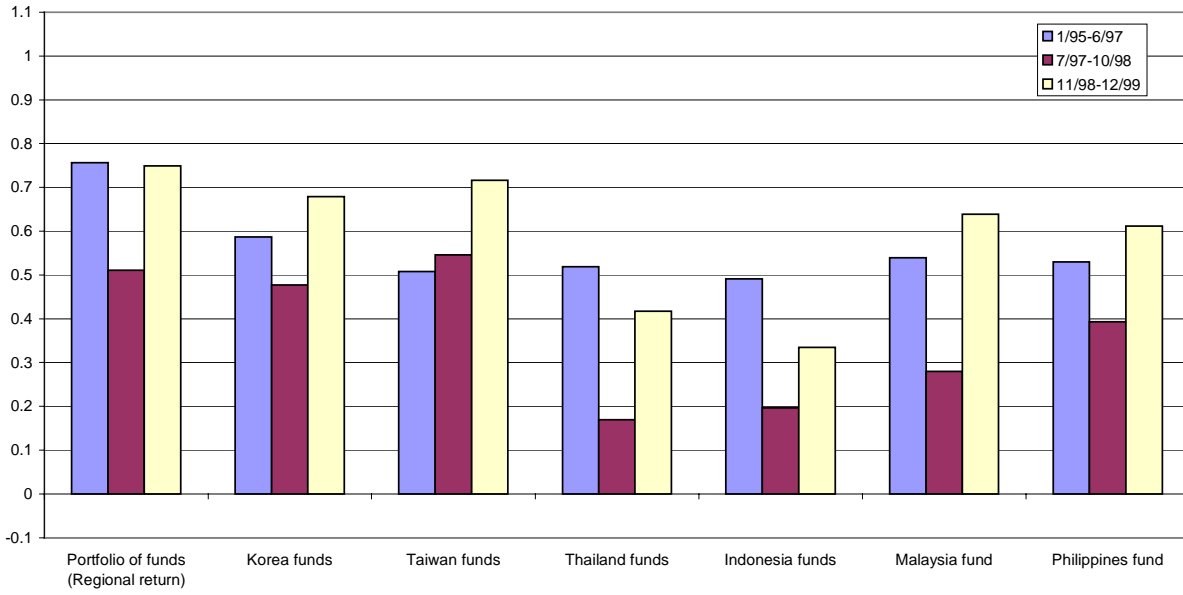
Graph 4b
Effect of S&P 500 return on fund return
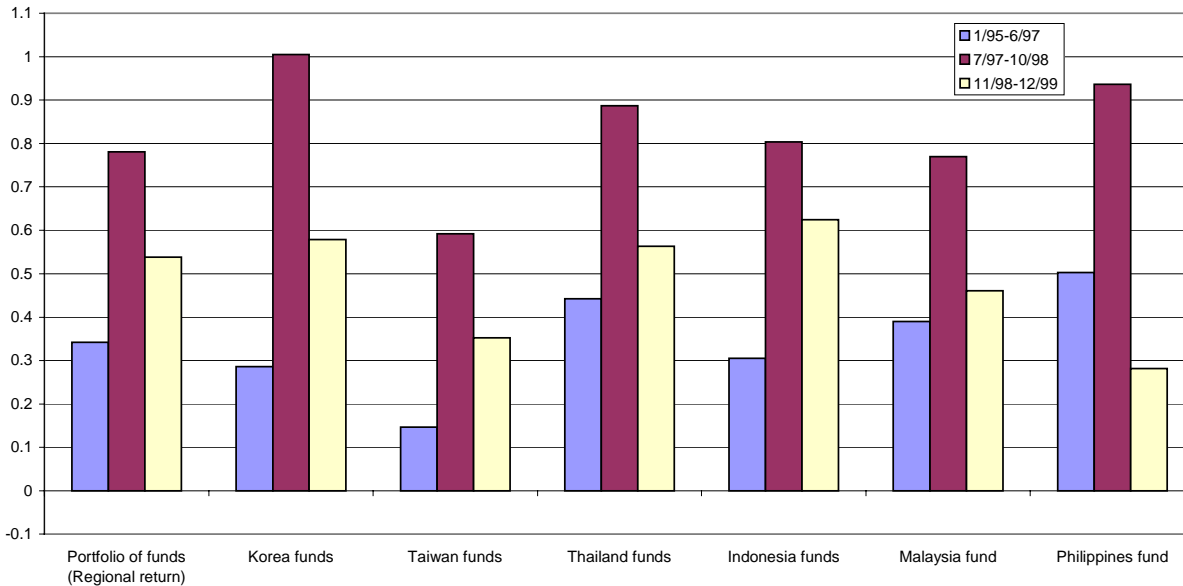
Effect of previous day's fund return on local market return
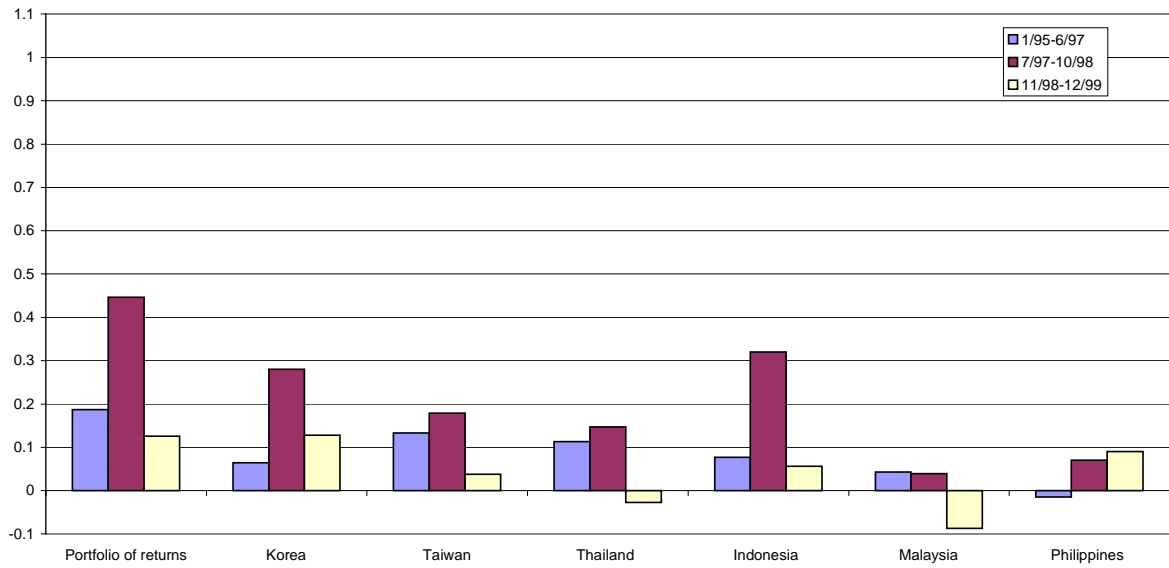
Graph 5b
Effect of previous day's S&P 500 return on local market return

25
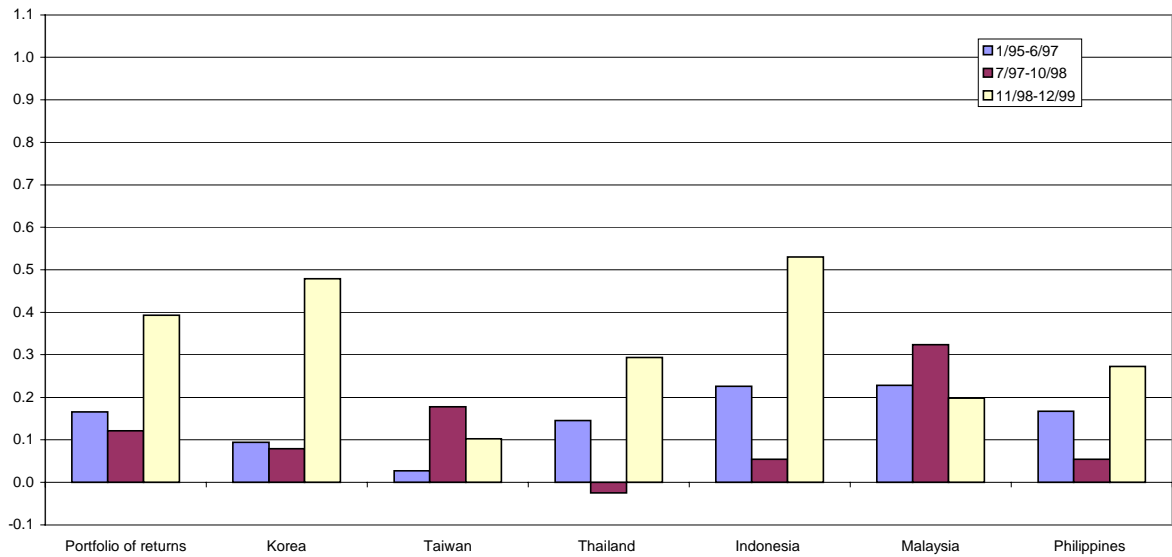
Graph 6

Purchases of equities by foreign investors and local market indices

Sources: State St.; Bloomberg; authors' calculations.

Sources: State St.; Bloomberg; authors' calculations.

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Graph 6 (cont)

Indonesia

Legend: Net equity purchases (left); LQ-45 Index (USD terms) (right)

Sources: State St.; Bloomberg; authors' calculations.

Malaysia

Legend: Net equity purchases (left); KLCI Index (USD terms) (right)

Sources: State St.; Bloomberg; authors' calculations.

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Graph 6 (cont)

Sources: State St.; Bloomberg; authors' calculations.

Table 1

Capital flows to Asian countries

in billions of USD

	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*
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 (USD millions)	Average premium 1995-99	Premium at 31/12/99
Korea Fund	8/29/84	825	+0.03	-0.31
Korean Investment Fund	2/1/92	71	-0.04	-0.31
Taiwan Equity Fund	7/1/94	NA	-0.15	-0.11
Taiwan Fund	12/1/86	NA	-0.09	-0.14
Thai Fund	2/1/88	97	+0.27	+0.31
Thai Capital Fund	5/1/90	NA	+0.18	+0.30
Jakarta Growth Fund	4/1/90	16	+0.10	+0.03
Indonesia Fund	3/9/90	24	+0.24	+0.19
Malaysia Fund	5/1/87	70	+0.12	+0.28
First Philippine Fund	11/1/89	56	-0.16	-0.20
Average		**166**	**+0.05**	**+0.00**

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

Sources: Bloomberg; authors' calculations.

Table 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	Jul 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.

Sources: Bloomberg; authors' calculations.

Table 5

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

Country	Market capitalisation (USD billions)		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

Sources: 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*	−0.002	−0.001	−0.001	−0.003*	−0.002	−0.002
	(−1.81)	(−1.57)	(−0.49)	(−0.85)	(−1.79)	(−1.24)	(−1.34)
d_t^{1198}	0.001	0.003*	0.002	0.000	0.002	0.001	0.002
	(1.22)	(1.81)	(1.29)	(0.14)	(0.82)	(0.29)	(1.12)
LR_t^i	0.756**	0.587**	0.508**	0.519**	0.491**	0.539**	0.530**
	(15.72)	(14.06)	(12.76)	(13.46)	(8.86)	(9.01)	(10.76)
$d_t^{797} LR_t^i$	−0.246**	−0.110*	0.038	−0.350**	−0.295**	−0.259**	−0.137*
	(−3.57)	(−1.91)	(0.55)	(−3.53)	(−4.41)	(−3.19)	(−1.67)
$d_t^{1198} LR_t^i$	0.238**	0.203**	0.170**	0.248**	0.139**	0.359**	0.219**
	(2.74)	(3.96)	(2.09)	(2.32)	(2.27)	(2.78)	(2.12)
RR_t^i		0.194**	0.322**	0.246**	0.187**	0.230**	0.256**
		(2.51)	(2.85)	(2.84)	(2.51)	(2.44)	(3.41)
$d_t^{797} RR_t^i$		−0.126	−0.282**	0.006	0.223**	0.026	−0.148*
		(−1.33)	(-2.33)	(0.05)	(2.01)	(0.22)	(−1.65)
$d_t^{1198} RR_t^i$		0.090	0.066	−0.113	0.069	0.243**	0.110
		(1.00)	(0.76)	(−0.79)	(0.41)	(1.97)	(1.05)
US_t	0.342**	0.286**	0.146*	0.442**	0.305**	0.390**	0.503**
	(12.33)	(4.07)	(1.90)	(6.86)	(3.78)	(5.68)	(5.42)
$d_t^{797} US_t$	0.439**	0.719**	0.447**	0.445**	0.497**	0.380**	0.433**
	(6.40)	(4.93)	(4.44)	(2.43)	(2.99)	(2.75)	(2.67)
$d_t^{1198} US_t$	−0.242**	−0.427**	−0.240**	−0.324	−0.178	−0.309*	−0.655**
	(−2.80)	(−2.84)	(−2.18)	(−1.59)	(−0.83)	(−1.66)	(−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 (cont)

Effects during 7/97–10/98:

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 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 R²	**0.27**	**0.31**	**0.07**	**0.15**	**0.09**	**0.13**	**0.22**

Table 7 (cont)

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:

$$FR_t^i = \alpha_0 + \alpha_1 LR_t^i + \alpha_2 RR_t^i + \alpha_3 US_t + \alpha_4 FR_{t-1}^i$$
$$+ \alpha_5 d_t^{797} + \alpha_6 d_t^{797} LR_t^i + \alpha_7 d_t^{797} RR_t^i + \alpha_8 d_t^{797} US_t + \alpha_9 d_t^{797} FR_{t-1}^i$$
$$+ \alpha_{10} d_t^{1198} + \alpha_{11} d_t^{1198} LR_t^i + \alpha_{12} d_t^{1198} RR_t^i + \alpha_{13} d_t^{1198} US_t + \alpha_{14} d_t^{1198} FR_{t-1}^i$$
$$+ \alpha_{15} LR_t^{i2} + \varepsilon_t^i$$

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

$$h_t^i = \gamma_0 + \gamma_1 \varepsilon_t^{i2} + \gamma_2 h_{t-1}^i + \gamma_3 d_t^{797} + \gamma_4 d_t^{1198} + \gamma_5 LR_t^{i2} + \gamma_6 d_t^{797} LR_t^{i2} + \gamma_7 d_t^{797} LR_t^{i2}$$

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
$\hat{\varepsilon}_t^{i2}$	0.106**	0.043**	0.203**	0.077**	0.131**	0.113**	0.103**
	(4.02)	(2.32)	(3.73)	(2.67)	(4.21)	(2.34)	(2.88)
h_{t-1}^i	0.542**	0.776**	0.502**	0.666**	0.717**	0.396**	0.596**
	(11.77)	(13.63)	(7.08)	(8.01)	(13.84)	(3.92)	(7.56)
d_t^{797}	0.00002**	0.00004**	0.00002	0.00007	0.00007**	0.00019**	–0.00001
	(2.47)	(2.18)	(0.94)	(1.46)	(2.18)	(2.78)	(–0.83)
d_t^{1198}	–0.00001	–0.00004**	–0.00002	–0.00001	0.00006	–0.00011	0.00008**
	(–0.92)	(–2.01)	(–0.85)	(–0.15)	(1.24)	(–1.29)	(3.34)
LR_t^{i2}	0.121**	0.080**	0.041	0.094**	0.093*	0.103	0.066**
	(2.89)	(2.59)	(0.77)	(2.88)	(1.68)	(0.60)	(2.37)
$d_t^{797} LR_t^{i2}$	–0.004	–0.037	0.001	0.056	–0.067	–0.028	0.218**
	(–0.10)	(–1.26)	(0.01)	(0.71)	(–1.25)	(–0.16)	(3.11)
$d_t^{1198} LR_t^{i2}$	0.054	–0.014	0.016	–0.102	–0.039*	0.773*	–0.248**
	(1.30)	(–0.73)	(0.28)	(–1.10)	(–1.93)	(1.88)	(–3.07)
N	**1302**	**1302**	**1302**	**1302**	**1302**	**1302**	**1302**
Adj R²	**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 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 variable	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**	0.060**	0.106**	0.059**	0.137**	0.084**	0.093**
	(11.58)	(3.08)	(3.36)	(3.09)	(3.90)	(4.47)	(3.07)
h_{t-1}^i	0.599**	0.906**	0.720**	0.913**	0.719**	0.836**	0.853**
	(36.72)	(42.05)	(11.05)	(39.54)	(12.96)	(27.28)	(18.13)
d_{t-1}^{797}	0.00003**	–0.00001	0.00000	0.00000	0.00009	0.00002	0.00004**
	(3.01)	(–1.12)	(0.33)	(0.30)	(1.08)	(0.95)	(2.12)
d_{t-1}^{1198}	–.00007**	0.00002*	–0.00001	0.00001	–0.00002	0.00000	–0.00004**
	(–0.22)	(1.69)	(–0.48)	(0.75)	(–0.26)	(–0.07)	(–1.98)
FR_{t-1}^{i2}	0.002	0.009	0.024	0.008	0.032	0.016**	0.012
	(0.04)	(0.76)	(1.01)	(0.79)	(1.47)	(2.58)	(1.39)
$d_{t-1}^{797} FR_{t-1}^{i2}$	0.003	0.033*	0.021	0.014	0.296**	0.073	–0.014
	(0.04)	(1.90)	(0.60)	(1.12)	(2.91)	(1.11)	(–1.26)
$d_{t-1}^{1198} FR_{t-1}^{i2}$	0.001	–0.041	0.047	–0.033	–0.263**	–0.094	0.001
	(0.08)	(–1.58)	(1.14)	(–1.54)	(–2.45)	(–1.39)	(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**

Table 9 (cont)

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.

Korea

	Mean	Std Deviation	Minimum	Maximum
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

	Mean	Std Deviation	Minimum	Maximum
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

	Mean	Std Deviation	Minimum	Maximum
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

	Mean	Std Deviation	Minimum	Maximum
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

	Mean	Std Deviation	Minimum	Maximum
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

	Mean	Std Deviation	Minimum	Maximum
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

Sources: State Street; authors' 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	0.003	–0.010	0.003	0.003	0.008
	(0.56)	(0.35)	(–0.98)	(0.38)	(0.28)	(1.05)
LR_t^i		0.603**	0.440**	0.297**	0.431**	0.510**
		(22.66)	(11.87)	(10.04)	(8.70)	(11.23)
$IF_t^i * LR_t^i$		–0.898**	–1.504**	0.752*	–1.932**	–0.194
		(–3.82)	(–2.36)	(1.71)	(–2.65)	(–0.32)
RR_t^i	0.658**	0.114**	0.135**	0.340**	0.237**	0.150**
	(18.90)	(2.74)	(2.22)	(5.09)	(4.16)	(2.85)
$IF_t^i * RR_t^i$	–1.066*	–0.212	1.482	–1.586	1.587*	0.109
	(–1.93)	(–0.82)	(1.64)	(–1.53)	(1.90)	(0.19)
US_t	0.476**	0.491**	0.517**	0.448**	0.485**	0.565**
	(11.28)	(8.56)	(6.99)	(5.50)	(7.81)	(7.72)
$IF_t^i * US_t$	0.108	0.521	1.052	0.341	–0.358	–1.139
	(0.12)	(0.59)	(0.75)	(0.35)	(–0.28)	(–1.12)

Table 11 (cont)

Explanatory variable	Portfolio of funds	Korea funds	Thailand funds	Indonesia funds	Malaysia fund	Philippines fund
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 R²	**0.37**	**0.42**	**0.25**	**0.25**	**0.19**	**0.27**
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****

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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; 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**	0.024*	0.016	0.018	0.035**	0.017**
	(3.22)	(1.92)	(1.32)	(0.99)	(3.44)	(2.56)
FR_{t-1}^i		0.142**	0.058	0.241**	–0.002	0.037
		(3.23)	(1.37)	(4.16)	(–0.08)	(1.32)
$IF_{t-1}^i * FR_{t-1}^i$		–0.145	1.435*	–0.435	0.745	–0.388
		(–0.20)	(1.87)	(–0.66)	(1.22)	(–0.90)
FRO_{t-1}^i	0.213**	0.042	0.191**	0.442**	0.064	0.289**
	(5.12)	(0.88)	(3.21)	(2.37)	(1.42)	(7.16)
$IF_{t-1}^i * FRO_{t-1}^i$	–0.744	0.428	1.403	–1.070	2.951**	–0.318
	(–0.86)	(0.57)	(1.46)	(–0.27)	(2.20)	(–0.53)
US_{t-1}	0.293**	0.173**	0.198**	0.099	0.287**	0.191**
	(6.30)	(2.53)	(2.40)	(0.70)	(5.51)	(3.86)
$IF_{t-1}^i * US_{t-1}$	–2.128**	–1.508	–1.904	1.973	–2.086*	0.304
	(–2.34)	(–1.16)	(–1.23)	(0.66)	(–1.69)	(0.37)

Table 12 (cont)

Explanatory variable	Portfolio of returns	Korean loc return	Thailand loc return	Indonesia loc return	Malaysia loc return	Philippines loc return
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**
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**

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