BIG FISH IN SMALL PONDS: THE POSITIVE FEEDBACK TRADING AND PRICE IMPACT OF FOREIGN INVESTORS IN ASIAN EMERGING EQUITY MARKETS

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This paper analyses daily data for the net purchases by foreign investors in six Asian emerging equity markets over 1999-2002. There are two major new findings. First, foreigners' net purchases demonstrate strong evidence of positive-feedback trading with respect to recent global, as well as domestic, equity returns. Second, the estimated price impacts associated with the trading of foreigners is much larger than earlier estimates. The pattern and speed of the positive-feedback trading suggests that it is due either to foreigners extracting information from recent returns or to behavioural factors, rather than to a portfolio-rebalancing model. The price impact of foreigners' trading appears to primarily reflect permanent price pressures from demand shocks, but surprisingly appears no larger than related US estimates of price impacts. Overall, the results suggest that foreign investors and external conditions have a more significant impact on emerging markets than implied by previous work.

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BIG FISH IN SMALL PONDS: THE MOMENTUM INVESTING AND PRICE IMPACT OF FOREIGN INVESTORS IN ASIAN EMERGING EQUITY MARKETS

1. Introduction

The rapid growth of cross-border equity investment in recent years has generated much interest in the behavior and impact of foreign investors, especially in emerging markets. Foreigners are frequently viewed as influencing prices in these countries and their trading is closely watched.

Yet there is only limited research and little consensus on this important topic. Many accounts have labeled foreign investors as momentum investors, although there is limited evidence as to whether the trading of foreigners occurs concurrently with price changes, or subsequent to them. Other accounts have identified foreigners as herding in their trading patterns, yet there is little evidence as to whether this herding is a common response to some type of news or price change, or is independent of it. Indeed, there is no evidence as to whether what appears to be momentum investing or herding by foreigners might not be better characterised as reflecting the contrarian trading or herding of the domestic investors that by definition are on the other side of the trades. More generally, there is little evidence as to what types of domestic investors tend to be on the opposite side of trading by foreign investors. Furthermore, although there is a literature that attempts to ascertain the impact of foreign investors on the second moment (the variance) of returns, there is actually very limited evidence about the magnitude of the impact of foreign investors on the first moment (the level) of returns. And if indeed the trading of foreign investors is correlated with returns, there are opposing views as to whether this reflects the informational advantage or disadvantage of foreigners. In addition, if trading by foreign investors creates price pressures in emerging markets, there appear to be different views as to whether or not this is destabilising. Finally, by some accounts, investment in emerging markets is driven substantially by conditions in mature markets, including a "search for yield" at times of low returns in the latter markets. Yet this channel has found little support. More generally, it is unclear whether "push" (external) or "pull" (internal) factors are dominant in explaining flows to emerging markets.

The most comprehensive study to date of the relationship between flows and returns is the work of Froot, O'Connell and Seasholes (2001) who use proprietary data for flows from State Street Bank and Trust. One of the strengths of the State Street data is that they are available for a very large number of countries, and Froot, O'Connell, and Seasholes include 44 countries in their study. However, the data are only a partial measure of the flows of foreign investors, since they relate only to the trades of one particular custodian. Further, the data from State Street are not for the actual trades of foreign investors but are based on contractual settlement dates. Froot,

O'Connell and Seasholes use data on settlement conventions in each country to infer the dates that trades actually occurred. However, it is quite possible that this introduces errors, because the data used in the study appear to show trading on all weekdays, including public holidays in each market, but appear not to show Saturday trading in those markets where trading occurred on Saturdays for some or all of the sample period.

The possible shortcomings of the State Street data suggest that there may be benefits to a study using precise daily data for the actual trades of all foreign investors. Accordingly, this paper attempts to shed light on a number of the above-mentioned important and unresolved issues concerning the flows of foreign investors, using daily data on total foreign inflows into six Asian equity markets over 1999-2002. The aim is to provide new evidence on the determinants of foreign investment and the impact of foreign trading on domestic asset prices. The sample size of six markets is large enough to provide results that are potentially fairly general, yet is small enough to allow adequate attention to market-specific data issues and modelling decisions that might not be possible in datasets with a larger number of markets.

By using daily data, this study is able to study the high frequency relationships between flows and returns and conducts tests of linkages that have not been feasible in previous studies using weekly, monthly or quarterly data (e.g., Bohn and Tesar, 1996; Clark and Berko, 1997; Brennan and Cao, 1997; Dahlquist and Robertsson, 2001; Karolyi, 2002). In addition, because the dataset includes the purchases of all foreign investors, it has broader coverage than studies that focus on one type of investor—for example US investors in the numerous studies using the US Treasury data (e.g., Bekaert, Harvey, and Lumsdaine, 2002), or mutual funds (e.g., Kaminsky, Lyons, and Schmukler, 2000; Borensztein and Gelos, 2002) or customers of a particular custodian (e.g., Froot, O'Connell, and Seasholes, 2001).

The markets studied are the Jakarta Stock Exchange, Korea Stock Exchange, Kosdaq Stock Market, Philippine Stock Exchange, Stock Exchange of Thailand, and Taiwan Stock Exchange. This study is not the first to use data from these exchanges on the trading patterns of investors. For example, Choe, Kho, and Stulz (1999, 2001) and Kim and Wei (2001) have use the Korea Stock Exchange data at the individual stock level, Seasholes (2001) has used the Taiwanese and Thai data, and Dvorak (2001) and Bonser-Neal et al. (2002) have used the Indonesian data. However, together with concurrent work by Griffin, Nardari, and Stulz (2002), this study is the first to do a systematic study across a wide sample of markets of the impact of prior returns on inflows.[1] Furthermore, unlike the paper by Griffin, Nardari and Stulz, this paper also investigates

[1] Griffin, Nardari and Stulz (2002) study the five main boards studied here (but not the Kosdaq), as well as the stock markets of India, Sri Lanka, South Africa and Slovenia.

the price impact of foreigners' trading, the trading behavior of different types of domestic investors, and the interaction between trading in the physical and futures market in one case (the Korea Stock Exchange) where data for foreign investors' net purchases are available for both markets. An additional factor distinguishing this paper is that many earlier studies have focused on the extraordinary 1997-98 crisis period or used pre-crisis data, whereas the 1999-2002 period that is studied here provides a more up-to-date snapshot of the role of foreign investors in more normal market conditions.

The investigation of the determinants of foreign inflows confirms the results of Froot, O'Connell and Seasholes (2001) of positive-feedback trading with respect to recent *domestic* returns. However, a new finding is that foreigners are also positive feedback traders with respect to recent *global* (especially US) returns, with these returns being far more important than domestic returns in the two largest markets. Indeed, analysis using vector autoregressions (VARs) suggests that foreign returns on average explain a greater proportion of the variance of net inflows than domestic returns, suggesting that "push" factors may be as important or more important than "pull" factors in explaining the dynamics of inflows into emerging markets.

These results raise the important question of why foreign investors are positive feedback traders. One possible explanation for the feedback trading with respect to foreign returns would be the portfolio rebalancing model proposed by Griffin, Nardari and Stulz (2002) whereby increases (decreases) in mature market equity prices alter the portfolio weights of foreign investors, who then seek to rebalance their portfolios by buying (selling) emerging market equities. We test this explanation by examining an implication of a rebalancing model, namely that foreign returns should affect inflows in those markets where domestic returns respond little to shocks in foreign returns (so that portfolio weights do change, requiring flows to restore portfolio weights) but should be unimportant in those markets where shocks to foreign stock prices are typically followed by similar changes to domestic prices (thereby leaving portfolio weights unchanged). It turns out that the data are at odds with this implication. In addition, the speed of the (essentially immediate) response to movements in foreign returns seems too rapid for a portfolio rebalancing explanation, given that rebalancings between asset classes such as these in reality are probably more of an annual occurrence than a daily one. This suggests that the importance of domestic and foreign returns may instead simply be because shocks to returns lead some foreign investors to revise their expectations about prospects for emerging markets. This would be consistent with the very strong finding that US technology returns are most important in explaining inflows into the heavily technology-oriented Korean and Taiwanese markets, where these returns can be viewed as news about fundamentals. Alternatively, the explanation may be more behavioral, and based on

foreign investor sentiment being affected by returns in emerging markets and in their home markets.

The data reveal a strong positive contemporaneous correlation between returns in these markets and the net purchases of foreigners. By contrast, the net purchases of domestic individuals are negatively correlated with returns, suggesting that foreigners are initiating trades. There is some evidence that surprises in inflows have ongoing impacts on prices beyond the day of the change in inflows, though most of this impact is complete within a few days. This result stands in marked contrast with the result of Froot, O'Connell and Seasholes that the contemporaneous price impact of the trades of foreigners is essentially zero, but that there is a substantial impact seen in the weeks and months following their trades.

These results raise the question of what type of model can best explain why net purchases (sales) by foreigners tend to be associated with increases (decreases) in stock prices. The most likely explanation for the strong contemporaneous correlation between inflows and returns would seem to be that the net purchases of foreigners represent substantial shocks to net investor demand in these markets. This is consistent with the substantial literature from mature markets showing permanent price increases from increased demand when stocks are added to benchmark indices. However, the price pressure explanation need not be entirely independent of an information explanation—foreign inflows are presumably not completely uninformed, but are based on perceptions that valuations are cheap or that increased allocations to emerging markets offer other benefits to their portfolios. Indeed, the price impact from increased foreign demand can also be thought of as part of the process of the integration of emerging markets into the global market, with most of the price adjustment associated with integration occurring through the process of increased foreign ownership rather than on the announcement of liberalisations. Although the estimated price impact is substantially larger than previous estimates for emerging markets, it is in line with estimates of price impacts in the US market. Overall, the results of the paper suggest a much larger role for foreign investors and conditions in mature markets than has been suggested by previous work.

2. Data

2.1. Basic Data

The six East-Asian markets studied in this paper are the Jakarta Stock Exchange (JSX), Korea Stock Exchange (KSE), Philippine Stock Exchange (PSE), Stock Exchange of Thailand (SET), Taiwan Stock Exchange (TWSE), and Kosdaq Stock Market. The first five of these are "main boards", while the sixth, which focuses on Korean start-up and technology related

companies, is a "second board", but nonetheless has a larger market capitalisation than many main-boards in other emerging markets. Data on daily net purchases were obtained from the exchanges and from CEIC and Bloomberg, two secondary providers.[2] Other data used in the study are taken from Bloomberg and include data for the capitalisation-weighted price index and market capitalisation of each local market, as well as data for various mature market equity price indices.

Foreign investors in these markets must register with the local exchange or regulator, and brokers must report the nationality of the buyer and seller in each transaction that occurs. The resulting data capture the trading of all registered foreign investors. One possible shortcoming with the data is that they do not capture net purchases by foreigners of ADRs or country funds in foreign markets, or equity futures trading in the domestic market. In the first two cases, the omission is unlikely to be serious, since trading in these is likely to be largely between foreigners, and is unlikely to result in substantial net purchases or sales by foreigners. The omission of futures (and other derivatives) trading might be more serious. Fortunately, daily data on the net purchases of foreigners are available for the Korea Stock Exchange's equity futures contract (for the Kospi 200 index). Thus in one case we are able to capture essentially all changes in foreign investors' equity exposures.

The study concentrates on the post-crisis period from January 1999 to September 2002.[3] The starting date was selected to exclude the sharp price falls in the Asian crisis in the second half of 1997 and also the subsequent strong price bounce-backs seen in most markets during 1998. The sample also corresponds fortuitously to the period after which trading on the two Korean exchanges switched (in December 1998) from six- to five-day trading.[4] Trading in all six markets was automated for the entire period of the study. To facilitate price discovery, all six markets have call auctions to determine opening prices and most also have call auctions to determine closing prices. The trading hours of the six exchanges all correspond to periods when US markets are closed.

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[2] Net purchases data from different sources were carefully checked against each other, and numerous errors were corrected. In the case of Indonesia and Philippines, there remained a few potential outliers that could not be confirmed. As a precaution, eight observations (all cases of apparent large net inflows) were omitted on the grounds that they appeared to be potential data errors. In several of these cases, it was possible to identify the observation as being a day in which a large privatisation sale had occurred, raising the possibility that some of these observations might be days when there had been large off-market privatisation transactions that had nonetheless shown up in the trading data.

[3] In the case of the Philippines, the data begin in March 1999.

[4] However, Saturday trading continued in Taiwan in 1999 and 2000 on the first, third and fifth Saturdays of each month. On those 51 occasions when there was Saturday trading, the data for Saturday were "merged" into the following Monday, with Monday returns being measured relative to Friday close, and Saturday net inflows included in Monday's flows.

There was no general limit on foreign investment for four of the six markets (the KSE, Kosdaq, JSX, and PSE) during the period of the study, although limits remain for some specific companies. Taiwan saw a substantial relaxation of foreign ownership limits during the sample period, with the general firm limit being increased from 30 to 50 per cent in March 1999, then to 75 per cent in October 2000, before its removal at the end of 2000. A few specific industries remain subject to limits. Thailand had a general limit of 49 per cent throughout the sample period, albeit with exceptions to allow the sale of troubled financial institutions to foreigners, and lower limits for specified industries.

Some summary data for each market and the role of foreigners are provided in Table 1. The markets include two exchanges, the KSE and TWSE, which are among the largest of all emerging markets and are comparable in capitalisation to some mid-sized mature equity markets. Trading on these two markets is also highly active, with 2001 annual turnover ratios well above most mature markets (including the New York Stock Exchange's 2001 turnover ratio of 0.89). The Kosdaq market is even more active, with annual turnover equivalent to about ten times market capitalisation, making it the most active exchange in the world. Turnover in the SET is reasonable by international standards, whereas turnover ratios for the JSX, and especially the PSE, are quite low. The latter two exchanges are also those where there is least variation in the daily net purchases of foreign investors (normalised by dividing by the previous day's market capitalisation). Overall, the share of foreign investors in total trading in the six markets would appear to be lower than their ownership share, indicating that foreigners trade less actively than domestic investors.[5] Indeed, with the development of institutional investors still at a relatively early stage in these markets, trading tends to be dominated by individual investors. For example, the share of individual investors in total trading in 2001 was 73 per cent on the KSE, 77 per cent in Thailand, 84 per cent in Taiwan, and an amazing 94 per cent on the Kosdaq.[6]

2.2. Descriptive statistics for net purchases of foreign investors in equity markets

Data on the properties of daily flows are shown in Table 2. Here and subsequently, daily net inflows are expressed as a percentage of the previous day's market capitalisation. The data in

[5] This contrasts with previous evidence for mature markets (e.g., Tesar and Werner, 1995; Dahlquist and Robertsson, 2001; Yamada, Bae and Ito, 2002) that turnover rates for foreigners are higher than for domestic investors.

[6] Data on the average size of individual trades of foreigners were not available, although data on the trades of foreign investors in Froot, O'Connell and Seasholes (2001) suggest an average trade size of about $200,000, presumably far above the equivalent figure for trades by domestic investors, suggesting that foreign investors are indeed "big fish" in these markets, even if they trade less actively than domestics.

Panel A show substantial positive autocorrelation in daily inflows, with a median autocorrelation of 0.47, confirming the finding of Froot, O'Connell and Seasholes (2001). This positive autocorrelation in flows could be due to particular investors establishing positions slowly (perhaps to reduce market impact), or to investors of similar types responding in the same direction—but with different speeds—to new information.[7] In those four markets where net purchases data are available for domestic institutions and individuals, the net flows of these groups are (not surprisingly) also highly autocorrelated. Although the flows data are strongly autocorrelated, the standard tests suggest strongly that they are integrated of order zero. Returns in these markets are far less autocorrelated, with a median autocorrelation of 0.09.

Within each market, there is a strong positive same-day correlation between net inflows and returns (Panel B). By contrast, the net purchases of domestic individuals are negatively correlated with returns, while the pattern is more mixed for domestic institutions. This contemporaneous correlation between flows and returns will be discussed further below, especially in Sections 4, 5 and 7. In most cases there is also strong positive correlation between net inflows across different exchanges (Panel C), although it is not as strong as the cross-exchange correlations in returns, with median correlation coefficients of 0.17 and 0.22, respectively. The positive correlations in net inflows suggest that there are common or related factors influencing flows. As will be shown in Section 3b, flows into each market tend to be positively correlated with recent own-market returns (which are correlated across markets) and recent returns in foreign markets. When these effects are extracted to yield a series for net inflows that remain unexplained by recent returns (or lagged inflows), the median correlation between net inflows falls substantially.

Finally, some data for the relationship between physical and futures trading on the Korea Stock Exchange are shown in Table 3. In contrast to the positive autocorrelations in all equities markets in Panel A of Table 2, the data in Panel B show significant *negative* first-order autocorrelation in the net purchases of foreigners in the Kospi 200 contract on the KSE futures market. Somewhat surprisingly, net purchases in the physical market are not significantly positively correlated with same-day net purchases on the futures market. However, there is a strongly significant positive correlation between net purchases in the physical market and previous-day net purchases on the futures market.

Together, these correlations are highly suggestive of a pattern whereby some foreign investors wishing to effect a change (either an increase or decrease) in their underlying physical position do so by first taking a short-term position in the futures market and then unwinding the

[7] Donahue and Froot (2002) explore the nature of the autocorrelation in flows using State Street data.

futures market position on the next day as they carry out the desired change in their longer-term position in the physical market.[8] Given the different trading behavior in the two markets, and the significant size of foreign investors' trading on the futures market (the standard deviation of daily futures market net purchases is 0.044 per cent of market capitalisation, only modestly smaller than the equivalent figure of 0.050 for the physical market) it follows that concentrating only on physical market transactions may give a somewhat misleading impression of the timing and impact of foreign investors' trading. Accordingly, the results presented in the remainder of the paper for the KSE are based on the sum of the net purchases of each investor group on both the physical and futures market. In combining the flows but using price data from only one market (the physical Kospi index), we are implicitly treating the two markets as closely integrated, an assumption that appears fully justified given the high turnover of both markets and the close linkages between both markets which are located on the same exchange.

3. How is the net demand of foreign investors related to prior returns?

3a. Introduction

Daily data allow a very precise analysis of the short-term determinants of net investor demand. In particular, if net purchases by foreigners (or any other group of investors) respond systematically to recent returns, daily data should be able to capture these linkages. The most comprehensive work to date in this area is by Froot, O'Connell and Seasholes (2001) who find strong evidence that flows into a market are positively correlated with lagged returns in that market. They suggest that this positive feedback trading may be evidence that some foreign investors use returns to extract information about future returns.

However, as is discussed below, it is also plausible that returns into a market could be driven by returns in other markets, which may suggest that the Froot, O'Connell and Seasholes bivariate empirical model might be excessively restrictive. In addition, given that returns in different markets are positively correlated, there is a possibility that the significance of lagged domestic returns may actually be proxying for the impact of lagged returns in foreign markets. Hence, the strategy in this section will be to confront the flows data with a group of returns series, and find which of these series can best explain flows. We then estimate VAR systems including foreign returns to get a more complete picture of the dynamics of the impact of returns on flows. In Section 6, we will then attempt to differentiate between some of the possible causal channels for the impact of returns on inflows.

[8] The phenomenon seems to apply symmetrically for both purchases and sales on the physical market.

3b. Regression analysis

We begin by proposing several different types of returns that might plausibly influence the net inflows of foreigners into Asian emerging equity markets. The possible explanators of inflows include:

Returns in the domestic market: Various models suggest that if foreigners have an informational disadvantage in emerging markets, they may use recent returns as an input in forming their expectations about future returns. Hence, their net inflows may be partly explained by lagged domestic returns. In each case we proxy domestic returns by the capitalisation-weighted index for the total market, in local currency.[9]

Returns in major mature markets: Investors in large mature markets might increase their allocations to emerging markets following increases in their home markets, due to portfolio rebalancing effects. For example, Stulz (1999) notes that it may be perfectly rational for US investors to invest more in emerging markets when their wealth increases, and Griffin, Nardari and Stulz (2002) propose a stylised model that contains such an effect. In this model, foreign investors from large (mature) markets increase their holdings of equities in smaller (emerging) markets to offset the changes in portfolio weights that result from price increases in their home markets. Alternatively, returns in mature markets might influence flows because investors extract information from global returns about prospects for emerging markets. Finally, a response of flows to returns in global markets may be more behavioral, and based more on sentiment than rational information extraction. We proxy these possibilities by including the daily returns on a broad portfolio of US stocks (the S&P 500 index) and a broad portfolio of stocks in all mature markets (the MSCI World index), both expressed in US dollars.

Returns in all emerging markets: Much investment in emerging markets occurs not via managers with a global mandate but rather with specialist managers investing only in emerging markets. Hence if portfolio rebalancing effects are important, the relevant return in the short-run might not be a global *mature* markets return, but rather the return on a basket of *emerging* market equities. Accordingly, the return on a diversified portfolio of emerging markets (the MSCI Emerging Markets Free index) is also included as a possible explanator.

[9] These indices are typically also the "headline" indices that are used in newswire stories reporting the performance of each market. They are available to investors on a real time basis, unlike some of the (less comprehensive) indices provided by international index providers such as MSCI and S&P/IFC. It should be noted that although the analysis uses domestic currency returns, the results are essentially unchanged using US dollar returns.

Returns on technology stocks: Several markets in the East Asian region are highly dependent on the global technology sector. For example, Taiwan and Korea are the homes of companies (Taiwan Semiconductor and Samsung Electronics) that are—by many measures—the world's largest semiconductor companies.[10] Hence, news about technology stocks in global markets could represent news about "fundamentals" that might influence the flows of foreigners. Accordingly, the return on the technology-intensive Nasdaq Composite index is included as a potential determinant of flows, along with the Philadelphia Semiconductor Index, which includes the stock prices of around 16 semiconductor stocks traded in US markets and is closely watched in some East Asian markets.

The basic empirical model regresses net purchases of foreign investors (as a per cent of total market capitalisation) in market i ($f_{i,t}$) upon lagged net inflows, contemporaneous own-market (or domestic) returns ($r_{i,t}$), and also on various lagged returns series (x_t):[11]

$$f_{i,t} = a_{i0} + a_{i1} f_{i,t-1} + \ldots + a_{i5} f_{i,t-5} + a_{i6} r_{i,t} + a_{i7} x_{t-1} + \ldots + a_{i11} x_{t-5} + \varepsilon_{it} \qquad (1)$$

Contemporaneous domestic returns are included for the following reason. As noted above, contemporaneous flows and returns are strongly correlated in every market. But returns in each domestic market on day t are strongly influenced by the prior overnight (day *t-1*) US returns. If the day t domestic return is not included in the flows equation, we run the risk that day *t-1* US returns will be found to be a significant explanator of flows, but that this might be spurious because it is picking up the omitted day t correlation between flows and domestic returns. To avoid the possibility of any such spurious correlation (but without any implications for causation), we include contemporaneous returns as a control variable in the flows equation.[12] [13]

[10] As of late 2002, the weights of these two companies in their national indices were 18 and 20 per cent, respectively. Some measures put the total weight of the technology sector in the Taiwan and Kosdaq markets at around 60 per cent.

[11] Returns are measured as the daily (log-difference) change in the relevant price index. The lag length is set at five, based on preliminary regressions and tests using the final full VAR systems—further discussion of this issue is provided below.

[12] The same issue arises in setting up the formal VAR system and determining the channels of contemporaneous causality for the impulse response function. As will be discussed there, the solution is to view the global trading day as beginning with (day *t-1*) US (and European) trading and then ending with (day *t*) Asian trading.

[13] The use of daily data with lags means that many observations would be lost due to missing values from market-specific holidays. Rather than assuming unchanged price levels when markets are closed (as is done by many data providers) and inferring a zero return, I deal with the problem as follows. I omit any day when there is no trading in the market that is the subject of the regression, and calculate the price change

(continued)

We begin the process of model selection by separately including each of six different returns series as the variable x_t in Equation 1, with the results provided in Table 4.[14] For reference, Panel A first provides the adjusted R-squared from equations with only lagged flows, and lagged flows plus contemporaneous domestic returns. Panel B then presents the adjusted R-squared for the equations that separately include five lags of each of the return variables, and the *p*-values for the hypothesis that the particular return series can be excluded. The results show that net inflows are significantly correlated in all cases except the KSE with lagged *domestic* returns. However, flows into four markets (the KSE, and Kosdaq, Taiwanese and Thai markets) are also strongly positively correlated with *foreign* returns. In two of these cases (the KSE and Taiwan), the US returns measures (especially the technology indices) add dramatically more explanatory power than domestic returns.

If several different returns series appear to have explanatory power for net inflows, one might then ask what combination of returns series best explains flows. This raises problems of choosing between many correlated regressors. It turns out that the results that follow are not dependent upon whether one sequentially adds potential explanators based on significance, or sequentially omits variables from the full set of potential explanator series. In the interests of giving the reader a better flavor of the relative strength of correlations, Panel C shows the results of testing for the statistical significance of additional returns series, after controlling for the correlation with the returns series that was the most significant series in Panel B.

In the case of Taiwan, which was one of the two cases where domestic returns were not the most significant variable, we find that domestic returns are statistically significant when added as an additional explanator. Thus in five out of six cases it would seem that domestic returns are significant determinants of flows into the domestic equity market. Hence, we confirm the result of Froot, O'Connell and Seasholes (2001), even after we allow for the inclusion of foreign returns. However, the case of the Korea Stock Exchange is less clear. Domestic returns are not significant (*p*-value = 0.14) when added to a regression for total (physical and futures) KSE net purchases that already includes the most significant foreign return. This is the result of a positive significant

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from the last time the market was open. I also omit any observation when the US market was closed on day *t-1*, and aggregate the daily net inflows in cases where the domestic market has traded during periods when the US market was closed. As a result, each observation in the VAR for a particular market corresponds to the minimum period necessary to get synchronized close-to-close data for both the US and domestic market.

[14] Each of the returns series is included in absolute terms. However, it might be argued that it should relative returns that drive flows. This has been tested by including each of the foreign returns in relative terms (the foreign return less the domestic return) as a potential explanator. However, the results favor the inclusion of absolute returns over relative returns.

impact of domestic returns on physical market inflows being offset by a negative impact on futures market net purchases.

Among the other four markets, foreign returns are strongly significant in addition to domestic returns in two cases (the Kosdaq and Thai markets), but insignificant in two others (the JSX and PSE). For the Kosdaq market, the technology indices are the most significant foreign returns indices, consistent with the significance of these series for the flows into the KSE and TWSE. In the Thai case, the MSCI World index is the most significant foreign index, but it is only marginally more significant than the S&P 500 and Nasdaq indices. Hence in four of the six cases, we find that foreign returns are significant explanators of flows, in some cases providing a very dramatic increase in explanatory power compared with equations including only domestic returns.[15]

Based on these exploratory results, Table 5 provides detailed equations for flows for each market which will be adapted for the VAR impulse response analysis described in next subsection. In each case the equations include both a domestic and foreign returns series. For the two Korean markets, the Philadelphia Semiconductor index is the most significant foreign returns series, while the Nasdaq index appears most relevant for Taiwan. For the Thai market there is little to distinguish between several foreign indices, so we include a US return for consistency with the previous cases, namely the return on the broad S&P 500 index. For the two cases (Indonesia and the Philippines) where foreign returns do not appear to have a direct impact of returns we nonetheless include the S&P 500 return, so that the VARs will be able to capture any indirect impacts via the impact of US returns on domestic returns.

A first point that might be noted from the flows regressions shown in Table 5 is that the high frequency net purchases of foreign investors can be surprisingly well explained by just a few variables. The median adjusted R-squared for the equations is 0.381, versus 0.212 for equations that include only lagged flows, and 0.301 for equations that also include contemporaneous domestic returns but not lagged domestic or foreign returns. It is not surprising, given the magnitude of the autocorrelation coefficients in Table 2, that much of the high R-squared comes from lagged net flows. Nonetheless, the substantial explanatory power of these equation stands in contrast to the finding of Brennan and Cao (1997) that equations for quarterly flows (of US investors) could explain only a small proportion of the variance.

The evidence that foreign inflows can be quite well explained by simple regressions such as these can be viewed as evidence that foreign investors tend to respond in a similar way to price

[15] In these cases, we have also tested whether additional foreign returns series might be significant explanators of returns. The additional explanatory power added by other returns series is fairly modest, so we do not attempt to include additional returns variables in the VARs that follow.

movements or the information that drives those movements. This similarity in trading patterns could be interpreted as a form of herding by those investors, even if it is unconscious. It suggests therefore that evidence of herding by foreign investors in other work might be at least partly due to a common response to price movements or other types of "fundamental" information, rather than any deliberate attempt to trade in similar ways to other foreign investors.

The second important point is that in every case except the coefficient on domestic returns on the KSE, the sum of the coefficients on lagged returns are positive, indicating that higher returns lead to higher inflows. The significance of some of the individual coefficients is striking. For example, the overnight return on US equities has a t-statistic of over 5 for the Kosdaq, KSE, and Thai markets, and over 15 in the case of the TWSE market. And the first lag of domestic returns is often also highly significant, with t-statistics of over 12 for Thailand, and averaging around 5 for Indonesia, the Kosdaq, and Taiwanese markets. Of course, these equations do not fully illustrate the dynamic impacts that are implied by the existence of positive autocorrelation in flows, nor the indirect impact of foreign returns on flows through their impact on domestic returns. These aspects are addressed in the next section via VAR systems.

3c. VAR analysis

Based on the above equations for flows, we now present the results of simulations of VAR equations for flows and returns. VARs have been used by Froot, O'Connell and Seasholes (2001), Karolyi (2002), Dahlquist and Robertsson (2001), Yamada, Bae and Ito (2002) and others to examine the correlation between inflows and returns in other contexts. An innovation relative to the VARs in Froot, O'Connell and Seasholes (2001) is to expand the VARs beyond a two equation VAR with flows and domestic returns. In particular, in the case of four of the six markets, the equations for flows would suggest the inclusion of a US returns index as a determinant of flows. In the other cases, there is a strong case for including US returns in the domestic returns equation, where they may have an indirect effect on flows.

In setting up the VAR, the considerations discussed in the previous subsection suggest treating the global trading day as notionally beginning with day *t-1* US (and European) trading, and then continuing into day *t* Asian trading.[16] Hence the VAR that is estimated is as follows

$$y_{i,t} = A_{i0} + A_{i1} y_{i,t-1} + \ldots + A_{i5} y_{i,t-5} + \varepsilon_{it} \qquad (2)$$

[16] Compared with the equations in Table 5, the equations for flows in the VAR exclude both contemporaneous domestic returns and day *t-1* US returns, with effects from these variables coming only through the Choleski decomposition of the day *t* residuals.

where

$$y_{i,t} = \begin{pmatrix} r_{us,t-1} \\ f_{i,t} \\ r_{i,t} \end{pmatrix}$$

and $r_{us,t-1}$ is the relevant US return on day *t-1*, $f_{i,t}$ is the net purchases (or flows) of foreigners in market *i* on day *t*, and $r_{i,t}$ is the return on market *i* on day *t*.

The impulse response analysis and variance decompositions that follow use the Choleski decomposition or "identification by ordering" to define the channels of contemporaneous causality. Returns in the US market on day *t-1* are assumed to be able to affect both day *t* net flows and day *t* returns in the markets studied in this paper, with no reverse impact. This assumption makes sense from strict temporal considerations (and from the more general observation that most global price determination seems to originate in US markets rather than in these Asian emerging markets). Within the domestic market, the contemporaneous causality is assumed to run from net inflows to prices, but not vice versa within the same day. This assumption will be justified further in Section 7, but is essentially the same assumption made in the papers cited earlier in this section.

The Akaike and Schwartz-Bayes criteria were used to investigate the appropriate lag length. The former suggests lag lengths of two (Taiwan, JCI), three (KSE, SET), four (Kosdaq), or five (PSE) lags, whereas the latter suggests a lag length of one in every case. Since degrees of freedom are not a constraint, a common lag length of five lags was adopted for all six markets. This lag length is far shorter than the 40 lags used by Froot, O'Connell and Seasholes (2001) for their daily net inflows data. However the shorter lags found here are consistent with the work of Griffin, Nardari and Stulz (2002) and would seem plausible given that the decay in autocorrelations in flows seems fairly rapid and smooth, and that market efficiency (if it holds) would suggest that returns should respond immediately to innovations in flows. With only five lags on each variable, the degrees-of-freedom concerns that may have prompted Froot, O'Connell and Seasholes to restrict parameters to be equal across all countries are not relevant. Accordingly, given the earlier clear evidence for different empirical models for different markets, separate empirical models are estimated for each market.

The first impulse responses studied are the response of net inflows to innovations in returns.[17] The impact of one per cent innovations to domestic and US returns are shown in Figures 1 and 2, over a 20-day period. The scale corresponds to the cumulative net inflows in

[17] For brevity, the detailed VAR equations are not shown but are available upon request.

basis points (i.e., hundredths of a percentage point) of market capitalisation that would result from a one per cent innovation in returns.[18]

In five out of six markets, the cumulative response of net inflows to an innovation in US returns is positive and significant, and in the sixth case (the Philippines) the point estimate of the cumulative response is also positive, though insignificant. Hence US returns have a significant impact on flows into emerging markets, even in one case (Indonesia) where they did not appear to have a significant direct effect in the flows equation. The response of net inflows to an innovation in domestic returns is positive and significant in four of the six cases. The exceptions are the two Korean markets. In the case of the Kosdaq, the response is positive but only borderline significant, while the response in flows into the KSE is negative, although insignificant.

The results suggest that innovations to US returns typically have larger impacts than equivalent innovations in domestic flows. The median impact of a one percentage point innovation in US flows is a cumulative increase in inflows equivalent to 0.88 basis points of market capitalisation, versus a median impact of 0.39 basis points of market capitalisation for a similar innovation in domestic returns.[19]

An alternative way to assess the relative impact of domestic and foreign returns is via variance decompositions of the VAR systems. Panel A of Table 6 presents estimates of the proportion of the variance in net inflows that is explained after 20 days by earlier innovations in the three variables in the VAR system. Not surprisingly, the data suggest that most of the variance in net inflows is due to lagged own innovations. However, the remaining variance in flows can be decomposed to see whether domestic or US returns are more important. In three cases (Indonesia, the Philippines and Thailand), a greater proportion of the variance in inflows is attributable to domestic returns rather than foreign returns. However, for the three other markets, foreign returns appear more important, dramatically so in the case of the KSE and the Taiwanese markets. Taking the median for the six markets, foreign returns account for about 6.1 per cent of the variance in net inflows, nearly twice as much as the 3.3 per cent figure for domestic returns.

Based on these estimates, one might conclude that conditions in mature markets (push factors) on average impact more upon flows than conditions in domestic markets (pull factors), at least so far as these can be captured by returns variables. The influence of foreign returns is via two channels, via direct impacts on flows, and indirectly via their impact on domestic returns which then impact on flows. The relationship between inflows and prior US returns is reminiscent

[18] Results showing the impulse response functions in standardised form are available upon request.

[19] Alternatively, a 100 per cent shock to foreign (domestic) returns would be associated with flows equivalent of 0.88 (0.39) percentage points of market capitalisation.

of the argument by Calvo, Leiderman, and Reinhart (1993) and others that flows to emerging markets are substantially driven by conditions in mature markets. However, the current finding is somewhat different to the channel proposed by Calvo, Leiderman and Reinhart, that flows to emerging markets were driven by low interest rates in mature market countries.

In testing the interest-rate channel, it would make little sense to include mature market interest rates (which are close to an I(1) variable) in an equation for flows (which clearly are I(0)). However, this channel was examined in the current context by including the overnight return on US bond markets (proxied by the return on the on-the-run 10 year bond) as an additional explanatory variable for net inflows, to see if inflows were more driven by the change in US bond yields than by changes in US equity prices. The results provided no evidence for the bond return variable being significant in any of the six markets, which may not be surprising given that the interest-rate channel has also failed to find support in some other work (e.g., World Bank, 1997). Nonetheless, the significance of mature market equity returns is certainly consistent with the Calvo, Leiderman and Reinhart notion that flows to emerging markets are partly "push driven."

4. How do net inflows affect domestic equity prices?

4.1. Introduction

The second major issue studied in this paper is the relationship between the net inflows of foreign investors and contemporaneous and future returns. Froot, O'Connell and Seasholes (2001) suggest that correlation between flows and future returns (or returns and lagged flows) accounts for a much greater proportion of the longer run covariance between flows and returns than the contemporaneous impact. Indeed, the VAR analysis in Froot, O'Connell and Seasholes suggests that there is essentially no contemporaneous price movement associated with trading of foreigners, but that prices rise (fall) in the 60 days following their purchases (sales), and that it takes about 15 days for half of the price impact to be observed. They note that one possible explanation for the extremely protracted impact of flows on prices is that foreigners have informational advantages when they trade outside their home markets. However, their result has two important implications that are worthy of further study. First, the nature of their estimated contemporaneous impact implies that foreigners are apparently able to transact in emerging markets with essentially no price impact. Second, the result that prices rise in the weeks and months following the purchases of foreigners would be suggestive of a fairly strong type of inefficiency in these markets, since returns could be predicted by lagged information.

Accordingly, this section investigates the relationship between net inflows and contemporaneous and future returns using our alternative dataset. It begins with single equation

regressions of daily returns on flows and then examines the impact of flows on returns in a VAR system. Based on these results, Section 7 will attempt a broader assessment of the impact of inflows on equity returns in emerging markets.

4.2. Regression estimates of the price impact of daily net inflows

The regression analysis begins with a simple bivariate regression of domestic returns on net inflows. The results in Panel A of Table 7 indicate—consistent with Panel B of Table 2—an extremely strong contemporaneous correlation, with a median *t*-statistic of around 10. The strength of the linkage will henceforth be described in terms of the price increase that is associated with net inflows equivalent to one per cent of market capitalisation (although daily flows are always far smaller than this). In the current case, the median regression coefficient implies that flows equivalent to one per cent of market capitalisation would be associated with a price increase of around 21 per cent.

However, in analysing the impact of flows on returns, it makes sense to add control variables that might potentially explain the movement in the local equity market that would presumably have occurred regardless of the particular portfolio decisions taken by foreign (and domestic) investors.[20] Accordingly, and since degrees of freedom are not a constraint, the regression coefficients shown in Panel B also include six control variables, including the previous overnight return on three US indices (the S&P 500, the Nasdaq Composite, and Philadelphia Semiconductor index) and the same-day return on three Asian mature markets (Tokyo, Singapore and Hong, Kong). The coefficients on net inflows are invariably smaller when these control variables are added to the regressions, and the median parameter estimate falls by about 30 per cent, suggesting that omitted variables may be a serious problem in bivariate regressions of returns and flows. However, flows remain a highly significant explanator of returns in all cases.

To the extent that flows are somewhat predictable, it might only be the surprise or unexpected component of flows that impacts upon prices, with the expected component having little or no impact (Warther, 1995). To test this, a series for "expected" foreign flows on day *t* was constructed based on the flow regressions in the VAR system, using only variables predetermined

[20] A simple example illustrates the possible problems from omitting relevant control variables. Regressions of stock returns in Tokyo or Sydney on same-day net inflows into the KSE both yield highly significant regression *t*-statistics. However, the reason is presumably not due to any causal influence from net flows into Korea, but instead because Korean inflows are correlated with the previous night's return in US markets, and Sydney and Tokyo returns also respond to the previous day's US return. Indeed, the significant correlation in regressions involving Japanese and Australian returns disappears once one controls for the overnight US return.

at the end of domestic trading on day *t-1*, that is excluding overnight US returns and same-day domestic returns. Unexpected flows were then derived as actual flows less expected flows. Panel C shows the results of the regressions explaining returns by the control variables and this decomposition of net inflows. In all cases except the Kosdaq, the coefficient on unexpected inflows is larger than the earlier coefficient on total flows, and highly significant, in accord with our prior expectation. However, in all cases the coefficient on expected inflows remains positive and statistically significant.

The relative importance of expected and unexpected inflows in any period depends on the relative variance of these two components, as well as on the regression coefficients for their impacts. Based on the regressions for net inflows, the standard deviation of the unexpected component of flows is typically about 1.6 times the standard deviation of the expected component. In combination with the larger regression coefficient on unexpected inflows (in all cases except the Kosdaq), it follows that the majority of the contemporaneous impact of flows on returns is attributable to the surprise component of inflows as opposed to the component that might be considered to be expected, based on lagged flows and other variables.

A final (and related) means of assessing the importance of lagged flows is to regress returns on contemporaneous unexpected flows, and lagged unexpected flows. Panel D presents the results of a regression of returns on the control variables, same-day unexpected flows and five lags of unexpected flows. The coefficient shown for lagged unexpected flows is the sum of the five regression coefficients, along with the *t*-statistic on the hypothesis that the sum is equal to zero. In four of the six markets, the cumulative impact of lagged unexpected flows is significantly positive, with a fifth case (the Philippines) which is borderline. In only case (KSE) is there no evidence that unexpected inflows do not have an ongoing effect past their initial impact.

4.3. VAR analysis of the price impact of daily net inflows

The overall picture that emerges from Table 7 is that although much of the impact of inflows on returns is contemporaneous, net inflows appear to have an impact on returns beyond the day of the actual inflows. A more complete examination of this phenomenon is possible via the VAR systems from Section 3c. In this case, the relevant impulse response functions is the response of domestic returns to innovations in net inflows. These are illustrated in Figure 3, and rely on the same identification assumptions as before. In all six markets, the cumulative impact on returns is positive and highly significant over the entire 20-day horizon. In all cases except the KSE there is also substantial evidence of continuation in the impact beyond the day of the inflows.

The median impulse response suggests that innovations to net inflows equivalent to one per cent of market capitalisation would be associated on average with a cumulative boost to equity prices of about 38 per cent. As will be discussed further in Section 7, the magnitude of the estimated impact of flows on domestic returns is large by the standards of earlier work. Just over half of the price impact is typically observed on the day of the surprise in inflows, and about 80 per cent of the impact is complete by the next day. The total impact is essentially complete within ten days.[21]

Another perspective on the importance of flows for returns can again be given by variance decompositions. As is shown in Panel B of Table 6, most of the variance in domestic returns is explained by their own lagged innovations. Based on the median values, US returns account for around 7.9 per cent of the variance in returns, whereas net flows account for about 9.4 per cent. Given the traditional view that the valuation of assets should not be affected by the distribution of the ownership of the assets, the fact that net inflows are on average more important determinants of domestic returns than US returns appears quite noteworthy.

The estimated timing of the impact of flows on returns in Figure 3 is substantially different to the timing of the impacts estimated by Froot, O'Connell and Seasholes (2001). Whereas the above results suggest that half or more of the price impact occurs on the same day of the trading, Froot, O'Connell and Seasholes find that almost none of the impact is contemporaneous and that it takes about 15 days for half of the price impact to be observed.[22] On the other hand, the current results would seem consistent with the results of Dahlquist and Robertsson (2001) who find using monthly data for Sweden that there is no price impact beyond the month in which the inflows occur.

Although the timing of the impact is estimated to be much faster than estimated in Froot, O'Connell and Seasholes, the fact there is any impact beyond the day of the impact is somewhat puzzling. In particular, pure price pressures from foreigners' demand shocks might be expected to be instantaneous and not protracted. Alternatively, if the fact that foreigners have been net purchasers of domestic equities has some information content, market efficiency would suggest that the price impact of this information should be felt as soon as it is revealed—on the day of trading in those cases where this information is available on a real-time basis, or at the start of the

[21] The Kosdaq is an outlier in terms of timing, with only about 10 per cent of the price impact being contemporaneous, and 50 per cent not occurring until three days after.

[22] Although it is hard to think of explanations for these findings it is presumably related to the finding by Froot, O'Connell and Seasholes that 40 lags are necessary in the VARs. Furthermore, it could perhaps be due to problems with the State Street data not being actual trading data, instead being data for contractual settlement dates, from which the trading dates must then be inferred.

next day's trading in those cases where the net purchases data are not available until after the market has closed. In either case, net purchases on day *t* should have no impact on prices beyond day *t+1*. In addition, the fact that net purchases are positively autocorrelated should not provide a reason for any ongoing price impact—market participants should understand that flows are autocorrelated and the full price impact should be registered immediately upon the initial innovation in flows. The ongoing impact of net inflows on returns is therefore a puzzle, though it is worth noting that more than 80 per cent of the impact is typically complete the day after the inflows.

5. What is the Role of Domestic Investors?

5.a. Introduction

Of course, foreigners are not the only participants in these equity markets and if one finds that foreigners typically are buyers following a certain shock then it follows that domestic investors in aggregate must be sellers in response to the same shock. Similarly, if net purchases by foreigners are associated with contemporaneous or subsequent price increases, then it follows that net purchases by domestic investors must be accompanied by price falls.

In this section, we investigate the four markets (the KSE, Kosdaq, TWSE and SET) where there exist data on the trading of subgroups of domestic investors to see if the different types of domestic investors behave differently and if it is only one group that tends to be on the other side of the trades involving foreign investors. For simplicity, the focus is on individual investors and institutional investors (defined as all other domestic investors) rather than on more detailed categorisations where they are available.

5.b. The impact of returns on net purchases by domestic investors

Figure 4 presents a summary of the impulse response functions from VARs similar to those estimated in Section 3c, except that the net purchases of foreigners are replaced separately by the net purchases of domestic individuals and institutions.[23] To conserve space, only the median estimate for the four markets is shown, along with confidence intervals based on the median standard errors. In the case of the response of net purchases to US returns, the median impulse response suggests little response from domestic institutions. By contrast, domestic individual investors tend to be net sellers following positive shocks in US returns, with three out

[23] The discussion that follows draws also upon results from equations for the net purchases of the two domestic groups, using the same methodology and explanatory variables as in Table 5. These are omitted for brevity but are available upon request.

of the four markets showing a strongly statistically significant response. The pattern and magnitude of this cumulative impulse response is reasonably close to the opposite of the response of foreigners. In the case of the response of flows to innovations in domestic returns, the evidence is less clear. In the first few days following the shock to domestic returns, the median response suggests that individuals are net sellers and individuals are net buyers, but over a longer horizon the cumulative flows of both groups tend to be both negative, albeit not statistically significantly so.

The results therefore suggest that it is individual investors who as a group tend to be more often on the other side of the trading of foreign investors. This is not surprising given the adding-up constraint and the fact that individual investors account for the largest share of trading in all markets. In every case where the cumulative response of individuals' flows is significant, the coefficient is negative, indicating that their trading pattern can be characterised as contrarian with respect to recent returns. The results for institutional investors are less clear, and indeed the VAR equations for their net purchases (not shown, but available upon request) show a much lower degree of explanatory power than for the other two groups. This may reflect the more heterogeneous nature of this group, which includes both institutions such as dealers trading on their own behalf, and others such as investment trusts (equivalent to mutual funds) whose trading flows may largely reflect the investment decisions of individuals.

The above results for foreign and domestic investors appear reasonably consistent with research into other markets. For example, Grinblatt and Keloharju (2000) find that foreign investors and sophisticated domestic institutional investors tend to be momentum investors in the Finnish market, whereas households and less sophisticated institutions tend to contrarians. And in the US market, Hong and Kumar (2002) and others have shown that individual investors tend to be contrarian with respect to recent price trends.

5.3. The impact on returns of net purchases by domestic investors

Figure 5 presents impulse response functions similar to those in Figure 3, except that we study the cumulative response of returns to innovations in the net purchases of domestic investors. The results indicate that innovations in the net purchases of individuals are associated with price declines, consistent with the correlations in Panel B of Table 2. This confirms the earlier finding that individuals tend to be more often on the opposite side of trading to foreigners. By contrast, innovations in the net purchases of domestic institutions are associated with price increases in these markets. The median cumulative price response associated with an innovation equivalent to one per cent of market capitalisation is reasonably similar in magnitude to the equivalent figure for foreigners (-29 per cent and 37 per cent, respectively, for these four markets) whereas the

median price response for domestic institutions is somewhat lower (24 per cent). As was the case for the foreigners, the median case suggests that more than half of the price responses are contemporaneous.

If net purchases by one group and net sales by another are associated with price increases, then it is reasonable to conclude that the former group is tending to initiate the trades by shifting its demand curve, whereas the latter group is more passively responding by moving along its demand curve. The evidence for these markets would imply that it is the trades of foreign investors rather than domestic investors that are driving prices. In particular, given that individuals represent the vast majority of trading in these markets, it seems reasonable to think of them as providing the bulk of the order book in these markets, and foreigners compensating individuals for providing liquidity when they wish to trade. In addition, based on the earlier regressions looking at the determinants of flows, it would seem that the feedback tendencies observed with respect to the previous day's price movements are more a reflection of active positive feedback trading by foreigners and that the apparent contrarian investing by individuals is somewhat more passive.

6. Why are foreigners positive feedback traders?

The findings of Section 3 raise the issue of why foreign investors in these six markets are positive feedback investors with respect to domestic and foreign returns. We begin by assessing some of the different possible explanations for why foreigners would be purchasers of emerging market equities following positive returns in *foreign* markets. Three competing explanations would seem plausible including a portfolio rebalancing model, an information updating explanation, or a behavioral channel.[24]

Although it is not possible to firmly distinguish between these competing explanations, it is possible to shed light on them. One way to assess the possible role of portfolio rebalancing effects is to measure whether movements in foreign asset prices actually lead to substantial changes in portfolio weights. The stylised model of Griffin, Nardari and Stulz (2002) assumes that the stock markets of the home (mature) market and host (emerging) market are uncorrelated. Hence absolute shocks to returns in mature markets are also shocks relative to the emerging market, and they change the portfolio weights of both foreign and domestic investors. It is these changes in portfolio shares (plus the assumption of home bias) that bring forth the portfolio flows

[24] Griffin, Nardari and Stulz (2002) provide a model showing the first channel. The latter two explanations presumably could be obtained in a model with the assumption that foreigners extract more information from returns than domestic investors, or that foreigners are more subject to such sentiment effects.

following price changes in mature markets. However, in reality the assumption of uncorrelated stock returns is tenuous. Indeed, prices in virtually all emerging markets appear to rise immediately following price shocks in major mature markets, with some responding approximately one-for-one. This can be formally tested by regressing the return in particular emerging markets on global returns, and then examining the magnitude of the regression coefficients, to test the extent to which absolute shocks to foreign returns are shocks relative to emerging market returns.

Accordingly, Table 8 shows the results for estimating a simple regression for each market, regressing 20-day (approximately monthly) local returns on the 20-day return on the MSCI World index (lagged one day to allow for a lagged response to US and European returns). The results imply that returns in four emerging markets (the KSE, Kosdaq, Taiwanese and Thai markets) typically move about one-for-one (or more) with movements in global markets. Hence for these markets, a shock to global returns typically does not result in a reduction in the weight of the emerging market in the portfolios of investors in mature markets. By contrast, in this sample period the two other markets (Indonesia and the Philippines) tended to move substantially less than one-for-one following movements in global equity prices, so in these cases, shocks to global returns would result in substantial changes in portfolio weights. The model of Griffin, Nardari and Stulz would therefore predict that increases in foreign returns should lead to net inflows into the latter group of markets, but should not lead to inflows into the first four markets.[25] However, this is exactly the opposite of what is observed in the equations in Table 5. Hence it seems that the actual pattern of the impact of foreign returns on net inflows is not consistent with a simple model of portfolio rebalancing from wealth effects.

An additional reason for skepticism about a portfolio reallocation explanation is that the response of foreign investors—which appears to occur immediately—seems too rapid for such an explanation. In particular, the utility losses from investors not making immediate portfolio adjustments are presumably quite small, especially given the transactions costs involved and the possibility of reversals of short-term price movements. Indeed, in practice much investment in emerging markets is via mandates to managers that specialise in these markets, and in these instances it is unrealistic that funds could be shifted so quickly from a manager with a US or mature markets mandate to a specialist emerging markets manager. More generally, the type of calculated portfolio rebalancing implicit in the Griffin, Nardari and Stulz model seems more likely to occur in annual portfolio reviews, whereas the immediate overnight adjustment that is

[25] Indeed, if one takes seriously the estimates of 1.42 for the KSE and 1.92 for the Kosdaq, a portfolio rebalancing model would suggest that positive shocks to mature market returns should have led to outflows from these two markets, rather than the strong inflows are actually observed.

observed is more likely to be from more opportunistic managers with relatively unconstrained mandates.

It is also noteworthy that in three of the four cases where foreign returns are significant explanators of flows, the most significant foreign returns series—by a very strong margin in the two largest markets—are technology-based indices (the Nasdaq or Philadelphia Semiconductor indices) rather than the broad indices that might be most relevant to the wealth of foreign investors. Given that the Taiwanese market and two Korean markets are heavily weighted in technology stocks (and their economies more generally are dependent on the technology cycle) the significance of the US technology indices seems far more consistent with a story of extraction of information about fundamentals rather than a model of portfolio shifts due to wealth effects.

An information extraction or extrapolative expectations explanation is presumably also the prime candidate for explaining the importance of lagged *domestic* returns in explaining the inflows of foreigners. Information asymmetry models (e.g., Brennan and Cao, 1997) would suggest foreigners might rationally derive information about future domestic returns from lagged returns. Whether this is entirely rational, or based more on sentiment is, of course, impossible to assess.

Indeed, the line between a rational information-extraction or extrapolative expectations explanation and a behavioral or sentiment model is presumably a fine one. For example, the significance of the technology indices in explaining inflows into Korea and Taiwan might alternatively be viewed as due to the (high) risk characteristics of the technology indices rather than to their industry-level information. For example, it was widely noted that emerging markets debt and some other risky asset classes frequently appeared to trade nearly tick-for-tick with the Nasdaq index during its run-up and subsequent decline in 1999 and 2000 (see Box 3.3 of IMF, 2000). Thus, the correlation with recent returns could be in line with the notion that investments in emerging markets over this period have tended to occur when markets are rising and risk appetite is increasing. This could be consistent with the finding by Brown et al. (2003) for the US and Japanese markets that investor flow variables (in their case, mutual fund flows) are measures of investor sentiment. More generally, either a fundamentals- or a sentiment-based explanation could be consistent with a view that emerging markets have been viewed by foreign investors as a "high beta" investment that should perform well in good states of the world and poorly in bad states.

7. Is the Estimated Large Price Impact of Foreigners Plausible?

7.1. What explains the within-day correlation between returns and inflows

One of the most noteworthy aspects of the net purchases data is the strong same-day correlation between returns and the net purchases of foreigners. The VAR analysis treated this correlation as reflecting causality from flows to returns. This assumption is standard and well justified in the empirical literature using actual trade-by-trade data, starting with Hasbrouck (1991), but it may be less well justified when trading data are aggregated over a whole day. Accordingly we begin the discussion of the price impact of trading by assessing the possible explanations for the strong same-day correlation between flows and returns.

There would seem to be at least five explanations. First, the correlation could reflect intra-day feedback trading, with foreigners actually increasing their holdings after price increases. Second, the correlation might reflect information revelation. If foreigners have information relevant to the pricing of domestic assets, this information might be revealed through their trading and contribute to price determination. Third, the correlation could reflect price pressures from permanent, but not necessarily "informed", changes in demand. If the demand curve for stocks is downward sloping (rather than flat as traditionally assumed—with prices purely determined by fundamentals and not demand and supply), then foreign inflows represent an outward shift in the aggregate demand curve and should result in permanently higher prices. Fourth, the correlation might reflect temporary price pressures. Purchases by foreign investors might drive up prices only in the short run, if temporary illiquidity results in a temporarily-downward-sloping demand curve. As portfolios of other investors are adjusted, initial price effects might be reversed on subsequent days. Finally, the correlation might simply reflect common correlation with omitted variables.

Although it is not possible to firmly distinguish these explanations, our results can shed some light. One clear result is that the correlation between flows and returns is substantially reduced when control variables are added to equations for returns. The most important variables in this regard are the overnight returns on various US equity indices which impact on both flows and domestic returns. In the examples studied here, the regression coefficients from flows to returns are reduced by about 30 per cent, highlighting the importance of controlling for other impacts on returns in flow-return analyses.[26] A second clear result is the lack of evidence to support the notion that the remaining correlation is from *temporary* price pressures that are subsequently unwound. Indeed, the evidence suggests some continuing impact on returns in subsequent periods.

[26] One possibility given the common correlation with prior US returns is that foreigners' flows into these markets may represent part of the adjustment of domestic prices to global equity market developments, just as Evans and Lyons (2003) have found that order flow in the foreign exchange market represents part of the process of price adjustment following macroeconomic news.

The regressions provide no particular test of the possibility of intraday momentum trading by foreigners. However, the portfolio allocation decisions of many large global investors are presumably made in their home markets (most often London or New York) during the previous day. Hence it would only be in cases where the foreign investor's local representative (or managers in regional offices in Singapore or Tokyo) had substantial scope for decision-making or flexibility in the execution of orders that intraday momentum trading by foreign investors would be possible. Indeed, if there is intraday feedback trading in these markets, it seems more likely to be done by domestic investors. Taken together, these points suggest that the same-day correlation between net inflows and returns is unlikely to be substantially due to intraday feedback trading by foreign investors.

The regressions also provide no particular test of the notion that the positive correlation between inflows and returns reflects superior information of foreigners that is revealed through their trading and reflected in prices. However, this seems somewhat unlikely, given the perceptions of many (e.g., Brennan and Cao, 1997) that foreigners should be expected to have an informational *dis*advantage and the mixed evidence in other empirical work (e.g., Choe, Kho and Stulz, 2001; Dvorak, 2001; Seasholes, 2001) as to whether the trading of foreign investors is consistent them having an informational advantage over domestic investors. Further, the flow regressions indicate that close to 40 per cent of the variance in daily net inflows can typically be explained purely by a few variables for lagged returns and lagged flows. This is suggestive of a model where foreign investors respond more to lagged information than to any informational advantage. Of course, if foreigners have informational advantages, the extent of these probably varies across different markets. For example, any informational advantage would probably be smallest in markets where there are many smaller opaque firms where information may tend to be revealed through insiders. However, a comparison of rankings of perceived transparency of markets (e.g. Wilshire Associates, 2002, p.34) and the magnitude of the price impacts provides little evidence to suggest that the magnitude of price impacts is correlated with a lack of transparency. Finally, if indeed the correlation is due to an informational advantage, evidence that net purchases are also correlated with exchange rate movements would suggest that the advantage is partly macroeconomic or global in nature, and not specific to the equity market.[27] Overall, there a number of reasons to doubt that superior information of foreigners is the explanation for the price impact of foreigners.

[27] For three of the five currencies, impulse response functions from trivariate VAR systems (with US returns, net inflows, and currency returns) suggest that (positive) innovations in flows are associated with statistically significant appreciations of the domestic currency. These results are available upon request.

Although informational trading or intraday momentum trading cannot be entirely excluded, the most likely candidate for explaining the same-day correlation between returns and net inflows would appear simply to be the price impact from increased demand. The price pressure explanation would certainly be consistent with the substantial literature from mature markets that there can be substantial price effects from demand shocks following announcements of inclusions or deletions to benchmark equity indices (e.g., Shleifer, 1986; Kaul, Mehrotra, and Morck, 2000).[28] For example, Sosner and Greenwood (2002, p.29) conclude their study of the impact of changes in the Nikkei index by noting that "the evidence strongly suggests that demand shocks are pervasive determinants of stock returns in the short run, even in such well functioning financial markets as the Tokyo Stock Exchange." A price pressure explanation would also appear also consistent with a recent study by Chakrabarti et al. (2002) showing that changes in the composition of the MSCI indices have substantial permanent effects on stock prices in emerging markets, including most of those markets studied in this paper. Overall, it would be somewhat surprising if foreign inflows, which can be quite substantial at times, did not have an impact on prices through pure demand pressures. Indeed, if the correlation is measuring a price pressure effect, it should be largest in the least liquid markets and smallest in the more liquid markets. This is exactly what is observed in the results. The price pressure effect appears to be largest in the two least liquid markets (the PSE and JSX, which have the lowest annual turnover ratios) and smallest in the markets that are most liquid by turnover measures (the Kosdaq, KSE, and TWSE). In addition, if demand shifts by foreign investors are associated with price pressures in the equity market, it might be expected that they would also be associated with price pressures in the foreign exchange market (since foreign investors must buy the domestic currency in order to buy domestic equities), a result that is confirmed for three of the five currencies.

Of course, the demand shock explanation need not be completely independent of an information-based explanation. Foreign inflows are presumably not completely uninformed, but are based on perceptions—perhaps based on an informational advantage about global valuations—that local valuations are cheap or that increased allocations to emerging markets offer other benefits to their portfolios. Furthermore, if the price increases that accompany inflows are due to increased demand, the substantial size of the price impacts suggests that local investors are being compensated substantially for providing liquidity to foreigners.

7.2. Comparison with other estimates of price impacts

[28] This would also be consistent with the evidence (see, e.g., Lyons, 2002) that order flow has significant persistent impacts upon exchange rates.

There are only a few earlier papers that provide estimates of the price impact of net purchases by foreigners, and some of these are not directly comparable with the estimates of this paper. The studies that are closest are those of Clark and Berko (1997) and Dahlquist and Robertsson (2001) who use monthly flows data that cover virtually all foreign investment into Mexico and Sweden, respectively. In the Mexican case, the estimates suggest that unexpected inflows equivalent to one per cent of market capitalisation boost returns by about 8 per cent, while for Sweden the price impact is about 3½ per cent. The estimates of this paper are clearly substantially larger, with the median of the estimates from the VARs suggesting an equivalent figure of about 38 per cent.

The results of Froot, O'Connell and Seasholes (2001, Table 9) appear at first glance to be more consistent with the current estimates, since their average impact for all emerging markets is that inflows equivalent to one per cent of market capitalisation boost stock prices in the long run by about 39 per cent.[29] However, the price impacts here are not directly comparable with those of Froot, O'Connell and Seasholes for two reasons. First, the latter estimates do not control for returns in US markets, and the impact of doing so would most likely be to lower the estimated price impact. Second, those results relate only to customers of State Street Bank and are a subset of foreign investors. If the trades of foreign investors who are not included in those data are substantially correlated with the trades of those who are included then the price impact of a much larger group of investors is being attributed to the State Street customers, and the price impacts reported by Froot, O'Connell would be an overestimate of the price impact of the universe of foreign investors.

Although they are substantially larger than the limited existing evidence, the estimated price impacts of this paper are not easily dismissed given the strengths of the data sample in this study (data for the actual trades of all foreign investors, over nearly 900 days) and extremely strong statistical significance of the estimated impacts. Perhaps an additional way to assess the plausibility of these results is by comparing them with some estimates of the price movements that accompany flows in the US equity market. One estimate is given by Warther (1995, Table 4) who examines the links between monthly flows into US mutual funds and US equity returns. His estimates imply that unexpected flows into mutual funds equivalent to one per cent of US market capitalisation are associated with a contemporaneous return of 52 per cent. This is somewhat larger than the median estimate obtained in this paper, suggesting that the price impacts estimated here might not be implausible.

[29] Interestingly, their estimates for East Asian emerging markets suggest that a shock of this magnitude to inflows causes a long-run *fall* in equity prices of about 31 per cent, a result that is not discussed. The eight countries in their East Asian grouping include five of the markets in this study.

An additional comparison with US data can be obtained by dividing the sample into days when net purchases are positive or negative, and then comparing the return differential with equivalent figures for the US market. For simplicity, some US data for comparison are taken directly from Edelen and Warner (2001) who calculate daily market-level abnormal returns associated with US mutual fund inflows and outflows. Their results show mean abnormal returns of 0.25 per cent on days with inflows and –0.25 per cent on days with outflows. In addition they cite four earlier studies on the price movements associated with the trades of institutions in individual stocks, which suggest that abnormal returns differ by around 0.52 per cent between days with net buying and net selling.

Table 9 presents data for the average daily returns for each of the six Asian markets on days with net inflows and days with net outflows. There are sharp differences, with median average return of 0.33 per cent (117 per cent annualised) on days with inflows and returns of –0.44 per cent (–65 per cent annualised) on days with outflows. Part of this difference is due to the fact that foreigners tend to be buyers following increases in US markets, and the markets studied here also tend to rise the day after US market increases. Accordingly, we calculate "abnormal" returns for each market by controlling for returns in the US market on the previous night, and for same-day returns in major regional markets.[30] The differences between abnormal returns on days with inflows and outflows remain strongly statistically significant, except in the case of the Kosdaq. The median estimate is that average abnormal returns are 0.27 per cent on days with net inflows and –0.26 per cent on days with net outflows, a difference of 0.53 per cent.

The daily average abnormal returns associated with the net trading of foreigners in Asian equity markets are therefore strikingly similar to the results in Edelen and Warner for the price impact of the trading of mutual funds and institutional investors in US markets. This is surprising given the conventional wisdom that the net flows of foreigners in these emerging markets are very substantial, and market liquidity is poorer than in mature markets. One possibility is that the consistency of results reflect consistency in the way that institutional investors operating in both types of markets behave in adjusting the size of their trades to limit market impact costs to acceptable levels. Regardless of the explanation, if trades and flows like those summarised by Edelen and Warner have substantial effects in the deep and liquid markets of the United States,

[30] The regression for each market includes a constant, the lagged domestic return, the overnight returns on the S&P 500, Nasdaq and Philadelphia Semiconductor indices, and the same-day returns on the Tokyo, Hong Kong and Singapore markets. The abnormal return is then defined as the regression residual.

the apparently large price impacts estimated in this paper for Asian markets may not be all that surprising.[31]

7.3. Price impacts and liberalisation of emerging equity markets

If the inflows of foreign investors into East Asian markets that have occurred over the sample period are part of the process of the integration of those markets into the global market, then the magnitude of the price impacts should be assessed relative to the literature on the impact of liberalisations of emerging equity markets. Henry (2000), Bekaert, Harvey, and Lumsdaine (2002), and others have shown that liberalisations are associated with price increases in emerging equity markets. For example, Henry estimates that initial stock market liberalisations are associated with an average revaluation of about 26 per cent. Such price impacts have been considered as evidence that the liberalisation of emerging markets enables greater risk sharing and reduces the cost of capital in emerging markets.

Stulz (1999) has argued that the price impacts estimated by Henry and others seem fairly small if liberalisations are viewed as credible and are expected to lead to substantial capital inflow. Indeed, if the price impacts found in this paper are part of the liberalisation and integration process, the results of this paper suggest that the price increases that accompany equity market liberalisation occur largely through the process of increased foreign ownership, rather than occurring immediately at the time of liberalisation. This seems entirely plausible, since liberalisation of laws and regulations is unlikely to result in integration of financial and product markets without actual increased foreign participation.

Some highly stylised figuring on the impact of greater foreign participation and integration would be as follows. Foreign inflows may spur improvements in management, governance and transparency and thereby increase both the level of corporate earnings and the valuation multiples applied to those earnings (see Stulz, 1999, for further discussion). For example, the longer-run impact of a complete liberalisation and integration of an emerging market could be to increase equilibrium price-earning ratios by a factor of 2½, say from 6 to 15.[32] In addition, the improvement in corporate management could easily result on average in a doubling of earnings. This would imply that prices could rise by a factor of 5 (i.e., by 400 per cent)

[31] Indeed, the finding of a large price impact for foreign investors suggests a caveat for studies of the profitability of their trading. In particular, if foreign investors have a major price impact when buying and have increased their holdings of equities substantially, then any paper profits would presumably be substantially reduced if they ever tried to unwind their purchases and reduce their holdings.

[32] Numbers of these magnitudes would appear consistent with actual data for aggregate price-earnings ratios, or with rough estimates of a Gordon growth model (as in Stulz, 1999).

following a completed liberalisation. One might then ask what level of foreign inflows would be required to bring about this price increase, based on the price impacts in this paper. Given the autocorrelations in inflows, the median price impact for surprise inflows equivalent to one per cent of market capitalisation of 38 per cent implies a price impact of about 16 per cent for total inflows. The implication is that inflows equivalent to about 25 (i.e., 400/16) per cent of market capitalisation would be required to raise prices by a factor of five. Assuming that the typical foreign market had around 10 per cent foreign ownership even prior to liberalisation, these flows would be sufficient to take foreign ownership to about 35 per cent of market capitalisation, which is not atypical for foreign ownership in fully liberalised equity markets. This example is clearly highly simplistic, but it suggests that the price impact estimated here is not entirely implausible in the broader context of the liberalisation of emerging equity markets.

8. Conclusion

The results of the paper suggest that much can be learned from an analysis using data for the daily trading activity of all foreigners in emerging equity markets. Perhaps the strongest new result is that the trading decisions of foreign investors are substantially influenced by recent returns in global equity markets in addition to returns in the domestic market. What is most surprising about this evidence of positive-feedback or momentum-type investing is its timing, that the trading of foreigners responds so quickly, to price changes that have occurred the previous day or overnight. The second major result is that foreigners have very strong price impacts when they trade. Together, these results suggest that foreign investors and conditions in mature markets have a much larger impact on emerging markets than has been suggested by previous work.

The evidence that foreigners respond to the previous day's price movements in foreign markets could conceivably be explained by a portfolio rebalancing model, although the discussion in Section 6 suggests that the speed and the pattern of the impact of foreign returns are inconsistent with such a model. Instead, the response of inflows to both foreign and domestic returns seems more likely to be the result of some combination of foreign investors using recent returns to extract information about future returns, and sentiment-driven trading or behavioral effects. Indeed, if emerging market equities are perceived as among the riskiest of assets, it might not be surprising that foreign investors buy when global risk aversion is falling and when rising prices in global markets lead them to revise upward their expectations about future performance of emerging market economies. Whatever the cause of this positive-feedback trading, since foreigners are essentially all institutional investors, it presents a very strong example of a form of high-frequency momentum trading by institutional investors and contrarian trading by individuals,

adding to the evidence for this form of trading in other studies using lower frequency data (e.g. Grinblatt, Titman and Wermers, 1995; Hong and Kumar, 2002). This evidence also adds to the growing body of evidence that investor heterogeneity is an important element in understanding the dynamics of financial markets.

The evidence of correlation between net inflows and prior foreign returns is clear evidence that investment in emerging markets is substantially affected by conditions in mature markets. The estimates of the relative importance of foreign and domestic returns in explaining flows would indeed suggest that "push" factors are at least as important as "pull" factors in explaining flows to emerging markets. Furthermore, the estimated price impact of foreign inflows suggests a far larger impact than has been suggested by previous work. The most logical impact for these price impacts would seem to be a simple story of demand shocks. That is, holding the portfolio preferences of domestic investors unchanged, decisions by foreigners to buy or sell are demand shocks that cause the aggregate demand curve to shift, resulting in price changes as domestic investors are paid to shift along their demand curves. However, it is also possible that the price pressures estimated here might be thought of as part of the liberalisation process, during which prices rise and the cost of capital falls. If this is correct, it implies that most of the price changes associated with liberalisation occur only through the process of greater foreign ownership, rather than at the announcement of the actual liberalisation.

The combination of trading driven substantially by conditions in other markets and large price pressures from the trading of foreigners raises the possibility that foreign trading can be destabilising in emerging markets. This may be a fact of life that policy makers in emerging markets have to accept, and attempt to ensure that their markets and institutions are sufficiently strong to be robust to inflows and outflows and the price changes that accompany them. However, a simple comparison with some earlier US research suggests that the average price impact of trading in these emerging markets may be no larger than the price impact of trading in the US equity market, perhaps indicating price pressure is a phenomenon that is widespread in financial markets and largely independent of the extent of market development.[33]

[33] Indeed, by some measures the global foreign exchange market might be considered the most financial liquid market in the world, yet here it has been noted that estimates of the elasticity of exchange rates to customer order flow are puzzlingly high (Lyons, 2002, p.265).

References

Bekaert, G., Harvey, C., Lumsdaine, R., 2002. The dynamics of emerging market equity flows. Journal of International Money and Finance 21, 295-350.

Bohn, H., Tesar, L., 1996. U.S. equity investment in foreign markets: Portfolio rebalancing or return chasing? American Economic Review 86 (2), 77-81.

Bonser-Neal, C., Jones, S.L., Linnan, D., Neal, R., 2002. Herding, feedback trading and foreign investors, Unpublished working paper, Indiana University.

Borensztein, E., Gelos, R., 2002. A panic-prone pack? The behavior of emerging market mutual funds. IMF Staff Papers, forthcoming.

Brennan, M., Cao, H., 1997. International portfolio investment flows. Journal of Finance 52, 1851–1880.

Brown, S., Goetzmann, W., Hiraki, T., Shiraishi, N., Watanabe, M, 2003. Investor sentiment in Japanese and U.S. daily mutual fund flows. NBER Working Paper 9470.

Calvo, G., Leiderman, L., Reinhart, C., 1993, Capital inflows and real exchange rate appreciation in Latin America: The role of external factors. IMF Staff Papers 40, 108-151.

Chakrabarti, R., Huang, W., Jayaraman N., Lee, J., 2002. The “index effect” on stock prices and trading volumes: International evidence, Unpublished working paper, Georgia Institute of Technology.

Choe, H., Kho, B., Stulz, R., 1999. Do foreign investors destabilize stock markets? The Korean experience in 1997. Journal of Financial Economics 54, 227–264.

Choe, H., Kho, B., Stulz, R, 2001, Do domestic investors have more valuable information about individual stocks than foreign investors? NBER Working Paper 8073.

Clark, J., Berko, E., 1997. Foreign investment fluctuations and emerging market stock returns: The case of Mexico, Federal Reserve Bank of New York, Staff Reports 24.

Dahlquist, M., Robertsson, G., 2001, Foreigners’ trading and price effects across firms. Unpublished working paper, Duke University.

Donahue J.T., Froot, K.A., 2002. The persistence of emerging market equity flows. NBER Working Paper 9241.

Dvorak, T., 2001, Do domestic investors have an information advantage? Evidence from Indonesia, Unpublished working paper, Williams College.

Edelen, R., Warner, J., 2001. Aggregate price effects of institutional trading: A study of mutual fund flow and market returns. Journal of Financial Economics 59, 195-220.

Evans, M.D.D., Lyons, R.K., 2003. How is macro news transmitted to exchange rates? NBER Working Paper 9433.

Froot, K., O'Connell, P., Seasholes, M., 2001. The portfolio flows of international investors. Journal of Financial Economics 59, 151–193.

Griffin, J., Nardari, F., Stulz, R., 2002. Daily cross-border equity flows: Pushed or pulled? NBER Working Paper 9000.

Grinblatt, M., Keloharju, M., 2000, The investment behavior and performance of various investor types: A study of Finland's unique data set. Journal of Financial Economics 55, 43–67.

Grinblatt, M., Titman, S., Wermers, R., 1995. Momentum investment strategies, portfolio performance, and herding. American Economic Review 85, 1088-1105.

Hamao, Y., Mei, J., 2001. Living with the 'enemy': An analysis of foreign investment in the Japanese equity market. Journal of International Money and Finance 20, 715-735.

Hasbrouck, J., 1991. Measuring the information content of stock trades. Journal of Finance 46, 179-207.

Henry, P., 2000. Stock market liberalization, economic reform, and emerging market equity prices. Journal of Finance 55, 529-564.

Hong, D., Kumar, A., 2002. What induces noise trading around public announcement events? Unpublished working paper, Cornell University.

International Monetary Fund, 2000. International Capital Markets: Developments, Prospects, and Key Policy Issues (IMF, Washington DC).

Kaminsky, G., Lyons, R., Schmukler, S., 2000. Managers, investors, and crises: Mutual fund strategies in emerging markets. NBER Working Paper 7855.

Karolyi, G., 2002. Did the Asian financial crisis scare foreign investors out of Japan? Pacific Basin Finance Journal 10, 411-442.

Kaul, A., Mehrotra, V., Morck, R., 2000. Demand curves for stocks do slope down: New evidence from an index weights adjustment. Journal of Finance 55, 893-913.

Kim, W., Wei, S., 2000. Foreign portfolio investors before and during a crisis. Journal of International Economics 56, 77–96.

Lyons, R.K., 2002, The Microstructure Approach to Exchange Rates (MIT Press, Cambridge MA).

Seasholes, M., 2001. Smart foreign traders in emerging markets. Unpublished working paper, University of California, Berkeley.

Shleifer, A., 1986. Do demand curves slope down? Journal of Finance 41, 579-89.

Sosner, N, Greenwood R.M., 2002. Trade and the comovement of stock returns: Evidence from Japan. Unpublished working paper, Harvard University.

Stulz, R., 1999. Globalization of equity markets and the cost of capital. Working Paper, Ohio State University.

Tesar, L., Werner, I., 1995. Home bias and high turnover. Journal of International Money and Finance 14, 467-493.

Warther, V., 1995. Aggregate mutual fund flows and security returns. Journal of Financial Economics 39, 209–235.

Wilshire Associates, 2002. Permissible equity markets: Investment analysis and recommendations. Report prepared for the California Public Employee's Retirement System.

World Bank, 1997. Private Capital Flows to Developing Countries: The Road to Financial Integration. World Bank, Washington.

Yamada, T., Bae, K., Ito, K., 2002. How do foreigners profit from local investors? Evidence from trades in the Japanese stock market? Hong Kong University School of Economics and Finance Working Paper 349.

Figure 1: VAR Impulse Responses of Net Inflows to Innovations in Domestic Returns

These charts show the cumulative response of net inflows into six East-Asian equity markets (in basis points of market capitalisation) to an innovation of one per cent in domestic equity returns. The estimates are obtained from three-variable vector autoregression (VAR) systems, which are described further in Section 3.3 and are estimated using daily data over 1999-2002. The variables in the VARs include the prior overnight return in the US market, net inflows, and the return on the domestic market. The dashed lines are 90 per cent confidence intervals based on asymptotic standard errors.

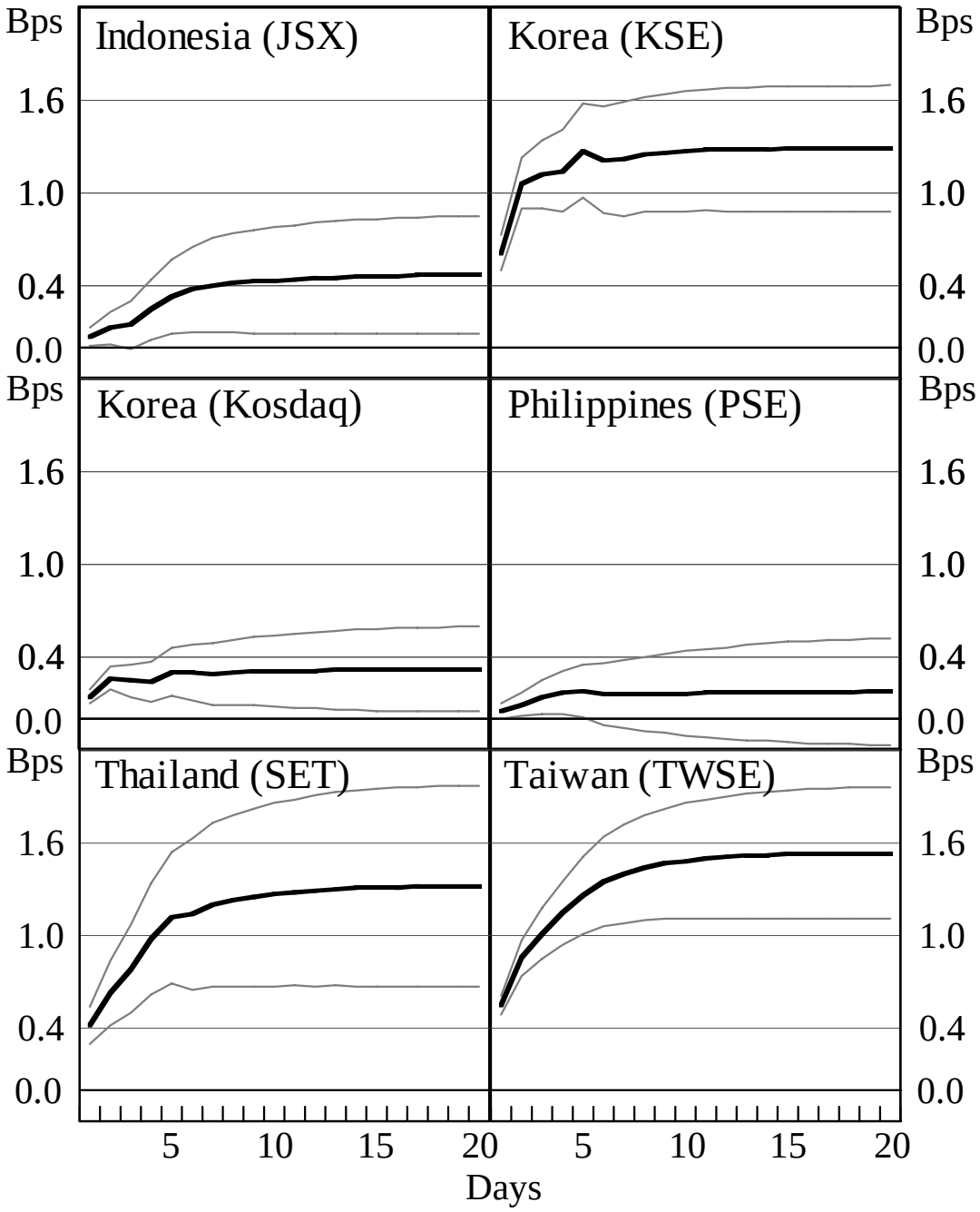

Figure 2: VAR Impulse Responses of Net Inflows to Innovations in US Returns

These charts show the cumulative response of net inflows into six East-Asian equity markets (in basis points of market capitalisation) to an innovation of one per cent in US equity returns. The estimates are obtained from three-variable vector autoregression (VAR) systems, which are described further in Section 3.3 and are estimated using daily data over 1999-2002. The variables in the VARs include the prior overnight return in the US market, net inflows, and the return on the domestic market. The dashed lines are 90 per cent confidence intervals based on asymptotic standard errors.

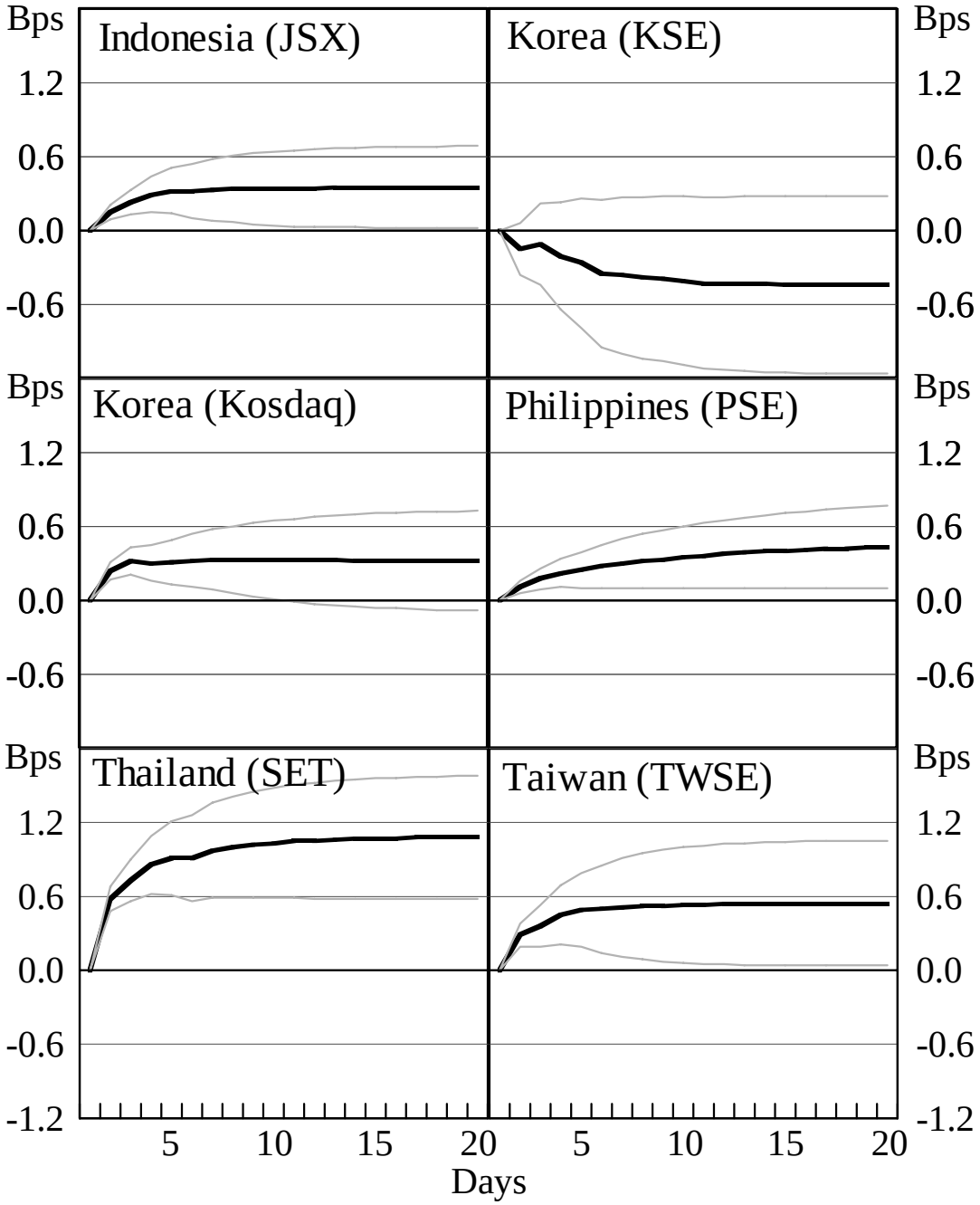

Figure 3: VAR Impulse Responses of Domestic Returns to Innovations in Net Inflows

These charts show the cumulative response of returns in six East-Asian equity markets to innovations in net purchases by foreigners. The scale is the percentage increase in prices resulting from inflows equivalent to one per cent of domestic market capitalisation. The estimates are obtained from three-variable vector autoregression (VAR) systems, which are described further in Sections 3.3 and are estimated using daily data over 1999-2002. The variables in the VARs include the prior overnight returns in the US market, net inflows, and the return on the domestic market. The dashed lines are 90 per cent confidence intervals based on asymptotic standard errors.

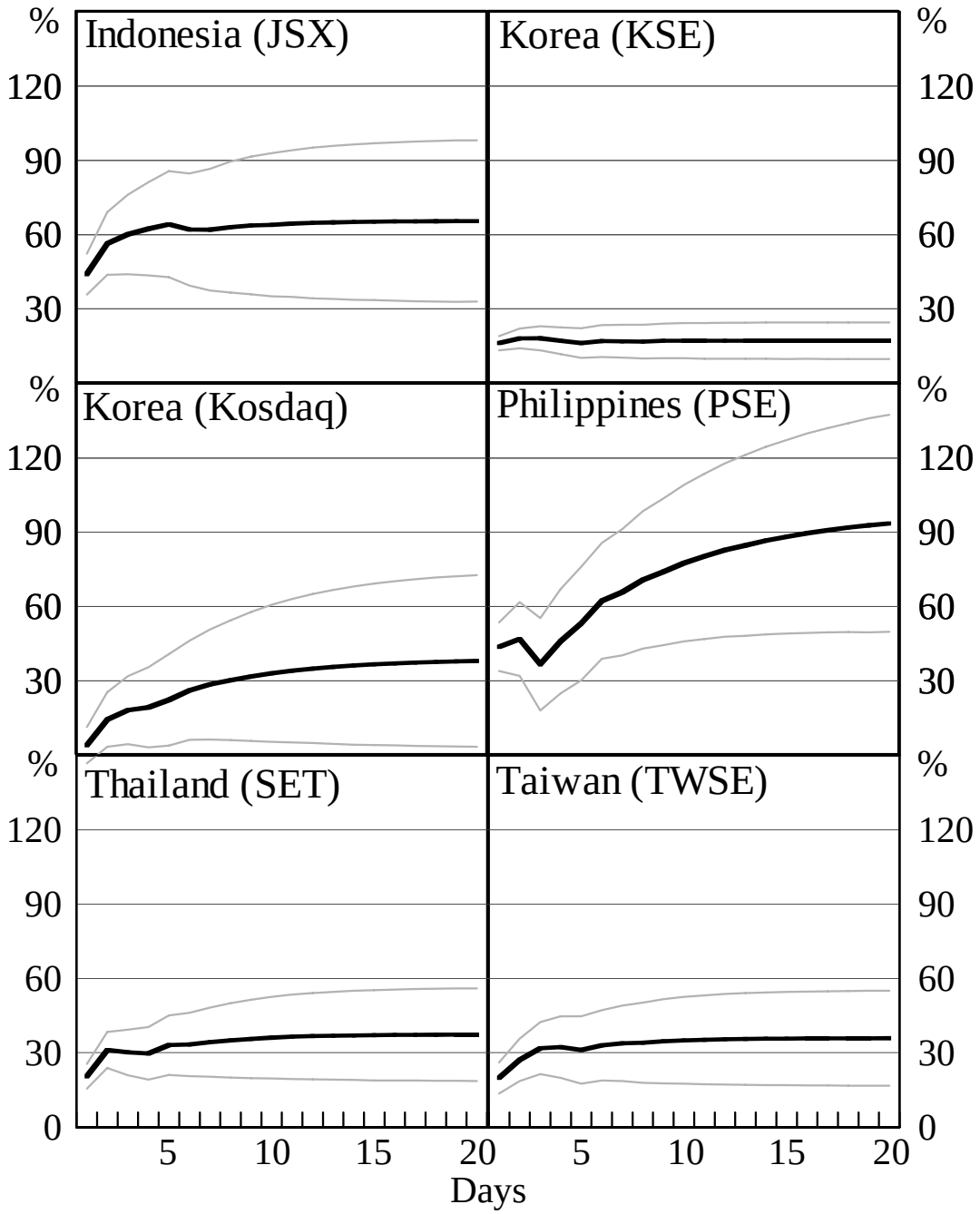

Figure 4: VAR Impulse Responses of Net Purchases of Domestic Investors to Innovations in Returns

These charts show the cumulative response of the net purchases (in basis points of market capitalisation) of domestic individuals and domestic institutions in four East-Asian equity markets to innovations of one per cent in US and domestic equity returns. The estimates are obtained from three-variable vector autoregression (VAR) systems, which are described further in Sections 3.3 and 5.2 and are estimated using daily data over 1999-2002. The variables in the VARs include the prior overnight return in the US market, net purchases, and the return on the domestic market. To conserve space, the charts show the median responses for the four markets (the Korea Stock Exchange, Kosdaq, Stock Market, Stock Exchange of Thailand, and Taiwan Stock Exchange). The dashed lines are 90 per cent confidence intervals based on the median value of the asymptotic standard errors.

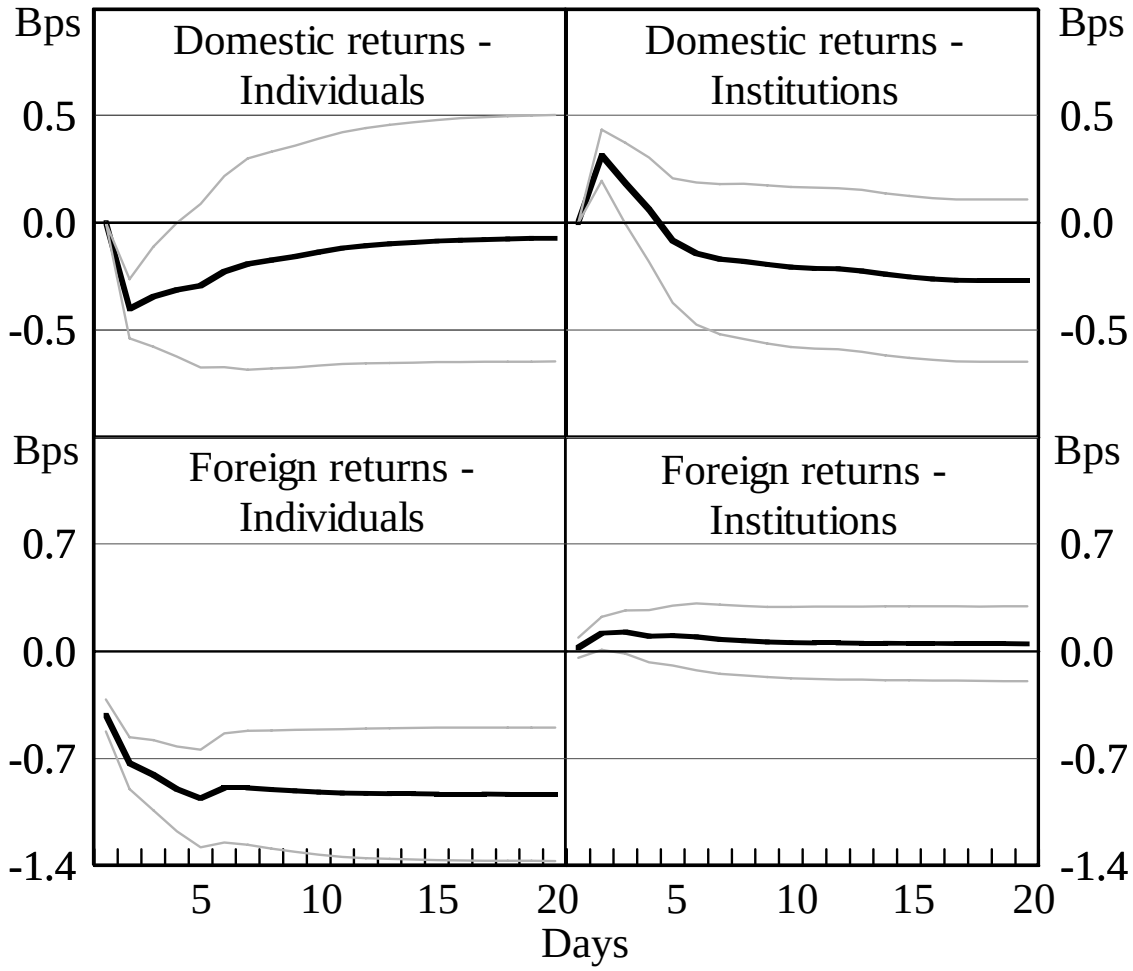

Figure 5: VAR Impulse Responses of Returns to Innovations in Net Purchases of Domestic Investors

These charts show the cumulative response of returns in four East-Asian equity markets to innovations in net purchases by domestic individuals and domestic institutions. The scale is the percentage increase in prices resulting from inflows equivalent to one per cent of domestic market capitalisation. The estimates are obtained from three-variable vector autoregression (VAR) systems, which are described further in Sections 3.3 and 5.3 and are estimated using daily data over 1999-2002. The variables in the VARs include the prior overnight returns in the US market, net inflows, and the return on the domestic market. To conserve space, the charts show the median responses for the four markets (the Korea Stock Exchange, Kosdaq, Stock Market, Stock Exchange of Thailand, and Taiwan Stock Exchange). The dashed lines are 90 per cent confidence intervals based on the median value of the asymptotic standard errors.

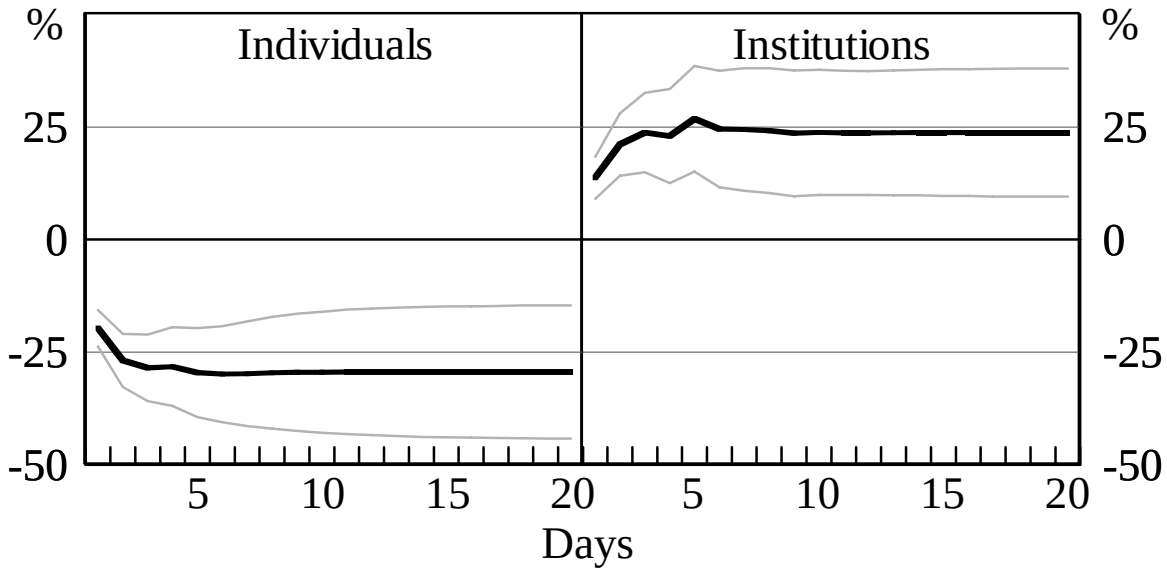

Table 1. Summary Data on Six Asian Emerging Equity Markets

This table provides summary data on the six equity markets included in this study, and the role of foreign investors. The turnover ratio is the sum for 2001 of daily turnover divided by the previous day's market capitalisation. The share of foreign ownership and foreign trading are both in value terms. The last column shows the standard deviation of daily net purchases by foreigners (expressed in per cent of the previous day's market capitalisation) over the full sample period, January 1999-September 2002. The data are from the exchanges, Bloomberg, and CEIC.

	Market size, end-2001, US$ bn.	Annual turnover ratio, 2001	Per cent of trading by foreigners, 1999-2001	Foreign ownership share		Standard deviation of daily inflows, 1999-2002
				end-1998	end-2001	
Indonesia (JSX)	23	0.38	23.0	n.a.	n.a.	0.016
Korea (KSE)	193	2.32	10.5	n.a.	36.6	0.050
Korea (Kosdaq)	39	9.85	1.1	3.4	10.4	0.033
Philippines (PSE)	43	0.07	29.8	n.a.	n.a.	0.012
Taiwan (TWSE)	292	2.08	3.7	7.4	13.4	0.032
Thailand (SET)	36	1.05	25.9	n.a.	n.a.	0.030

Table 2. Descriptive Data for Net Purchases of Different Investor Groups

This table provides summary data on the net purchases of different types of investors over 1999-2002, with net purchases expressed in terms of per cent of the previous day's market capitalisation. Panel A shows the first order autocorrelations in daily net purchases of the three investor types. Panel B shows the correlation coefficient between the daily net purchases of foreigners and same-day returns in that market. Panel C shows the cross-correlation coefficients between the net purchases of foreigners across different markets. The 2.5% critical values for the correlation coefficients are approximately ±0.08.

A: First-Order Autocorrelations in Net Purchases

	Foreigners	Institutions	Individuals
Korea (KSE)	0.43	0.17	0.34
Korea (Kosdaq)	0.35	0.23	0.29
Taiwan (TWSE)	0.46	0.32	0.42
Thailand (SET)	0.43	0.31	0.42
Indonesia (JSX)	0.54	n.a.	n.a.
Philippines (PSE)	0.48	n.a.	n.a.

B: Contemporaneous Correlation Between Net Purchases and Returns within Each Market

	Foreigners	Institutions	Individuals
Korea (KSE)	0.39	0.11	-0.44
Korea (Kosdaq)	0.16	-0.06	-0.04
Taiwan (TWSE)	0.34	0.57	-0.52
Thailand (SET)	0.32	0.11	-0.36
Indonesia (JSX)	0.37	n.a.	n.a.
Philippines (PSE)	0.31	n.a.	n.a.

C. Correlations Between Inflows into Different Markets

	JSX	KSE	Kosdaq	PSE	SET	TWSE
Indonesia (JSX)	n.a.	0.07	-0.11	0.18	0.17	0.02
Korea (KSE)	0.07	n.a.	0.34	0.09	0.24	0.47
Korea (Kosdaq)	-0.11	0.34	n.a.	-0.09	0.12	0.28
Philippines (PSE)	0.18	0.09	-0.09	n.a.	0.28	0.09
Thailand (SET)	0.17	0.24	0.12	0.28	n.a.	0.24
Taiwan (TWSE)	0.02	0.47	0.28	0.09	0.24	n.a.

Table 3: Relationship Between Physical and Futures Market Trading

Panel A shows the first-order autocorrelation coefficients for daily net purchases of foreign investors on the Korea Stock Exchange (KSE) equity market and futures market, and for combined net purchases on both markets. Panel B shows the correlation of foreigners' net purchases on the physical market, with same-day, previous-day, and next-day net purchases in the futures market. The futures market data are for the value of daily net purchases in the Kospi 200 futures contract. Net purchases for both markets are expressed in per cent of the previous day's KSE market capitalisation.

A: First-order autocorrelations in net purchases of foreign investors	
Korea Stock Exchange (physical) equity market	0.43
Korea Stock Exchange futures market	-0.27
Total	0.21
B: Correlations between net purchases on the physical and futures markets	
Physical (t), futures (t)	0.06
Physical (t), futures (t-1)	-0.19
Physical (t), futures (t+1)	0.00

Table 4: Testing for the Significance of Lagged Returns in Explaining Net Inflows

This table shows the results of regressions to determine the variables that best explain the daily net inflows ($f_{i,t}$) of foreign investors (expressed as a per cent of the previous day's market capitalisation) in six Asian equity markets over 1999-2002. Panel A shows the adjusted R-squared from a regression with only a constant and five lags of net flows, and an equation that also includes the contemporaneous return in the market ($r_{i,t}$). Panel B shows the adjusted R-squared from separately adding five lags of six different returns series (x_t). The equation estimated is:

$$f_{i,t} = a_{i0} + a_{i1} f_{i,t-1} + \ldots + a_{i5} f_{i,t-5} + a_{i6} r_{i,t} + a_{i7} x_{t-1} + \ldots + a_{i11} x_{t-5} + \varepsilon_{it}$$

P-values for the hypothesis that the particular lagged returns series can be excluded are shown in parentheses. Panel C shows the adjusted R-squared for equations that include the most significant lagged returns series from the regressions in Panel B, and also separately includes five lags of the remaining five returns series. The p-values in parentheses test the hypothesis that these additional returns series do not add explanatory power relative to an equation including only the most significant return series.

	JSX	KSE	Kosdaq	PSE	SET	TWSE
A: Adjusted R-squared from equations with no lagged returns						
With only lagged flows	0.304	0.048	0.167	0.286	0.196	0.227
With lagged flows and day t returns	0.397	0.296	0.177	0.360	0.263	0.305
B: Adjusted R-squared from adding lagged returns series (with p-value)						
Domestic returns	0.410	0.295	0.228	0.369	0.377	0.335
	(0.000)	(0.657)	(0.000)	(0.007)	(0.000)	(0.000)
S&P 500 returns	0.399	0.334	0.205	0.357	0.284	0.426
	(0.205)	(0.000)	(0.000)	(0.969)	(0.000)	(0.000)
Nasdaq return	0.396	0.342	0.212	0.357	0.282	0.465
	(0.743)	(0.000)	(0.000)	(0.971)	(0.000)	(0.000)
Phil. Semiconductor index return	0.397	0.357	0.211	0.358	0.280	0.454
	(0.416)	(0.000)	(0.000)	(0.828)	(0.000)	(0.000)
MSCI World index return	0.397	0.330	0.210	0.359	0.290	0.430
	(0.388)	(0.000)	(0.000)	(0.628)	(0.000)	(0.000)
MSCI Emerging Markets return	0.401	0.307	0.217	0.364	0.281	0.380
	(0.106)	(0.000)	(0.000)	(0.099)	(0.000)	(0.000)
C: Adjusted R-squared from equation including the most significant lagged returns series from Panel B, then adding additional lagged returns series (with p-value)						
Domestic returns	n.a.	0.359	n.a.	n.a.	n.a.	0.480
		(0.139)				(0.000)
S&P 500 returns	0.409	0.366	0.246	0.365	0.396	0.464
	(0.599)	(0.003)	(0.000)	(0.989)	(0.000)	(0.669)
Nasdaq return	0.407	0.357	0.253	0.366	0.396	n.a.
	(0.943)	(0.417)	(0.000)	(0.900)	(0.000)	
Phil. Semiconductor index return	0.408	n.a.	0.253	0.366	0.394	0.475
	(0.700)		(0.000)	(0.890)	(0.000)	(0.001)
MSCI World index return	0.408	0.367	0.250	0.367	0.398	0.468
	(0.783)	(0.003)	(0.000)	(0.778)	(0.000)	(0.076)
MSCI Emerging Markets return	0.410	0.364	0.242	0.370	0.376	0.473
	(0.312)	(0.011)	0.001	(0.194)	(0.582)	(0.003)
Memo item:						
Number of obs. in each eqn.	880	882	882	851	886	879

Table 5: Regressions Explaining Net Inflows

This table shows detailed results for regressions described in Section 3.2 explaining the daily net inflows ($f_{i,t}$) of foreign investors (expressed as a per cent of the previous day's market capitalisation) in six Asian equity markets over 1999-2002. The equation estimated is:

$$f_{i,t} = a_{i0} + a_{i1} f_{i,t-1} + ... + a_{i5} f_{i,t-5} + a_{i6} r_{i,t} + ... + a_{i11} r_{i,t-5} + a_{i12} r_{us,t-1} + ... + a_{i16} r_{us,t-5} + \varepsilon_{it}$$

where $r_{i,t}$ is the return on the domestic market and $r_{us,t}$ is the return on a US index. t-statistics are shown in parentheses. In the case of the coefficient sums, the p-values in parentheses are for the hypothesis that the sum of the regression coefficients is equal to zero. The US return series are the S&P 500 index (JSX, PSE, and SET), Nasdaq Composite index (TWSE), and Philadelphia Semiconductor index (KSE and Kosdaq).

Regression coefficient	JSX	KSE	Kosdaq	PSE	SET	TWSE
Constant	0.002	0.006	0.003	0.000	-0.001	0.005
	(4.0)	(3.2)	(3.0)	(0.5)	(0.9)	(5.9)
Net inflow (t-1)	0.376	0.095	0.221	0.285	0.261	0.266
	(11.1)	(2.8)	(6.5)	(8.3)	(7.6)	(7.8)
Net inflow (t-2)	0.140	0.034	0.069	0.131	0.006	0.116
	(3.9)	(1.0)	(2.0)	(3.7)	(0.2)	(3.3)
Net inflow (t-3)	0.003	0.096	0.105	0.076	0.121	0.028
	(0.1)	(2.8)	(3.1)	(2.1)	(3.4)	(0.8)
Net inflow (t-4)	-0.007	0.044	0.160	0.090	0.004	0.063
	(0.2)	(1.3)	(4.6)	(2.5)	(0.1)	(1.8)
Net inflow (t-5)	0.073	0.051	0.018	0.053	0.049	0.006
	(2.3)	(1.6)	(0.6)	(1.6)	(1.6)	(0.2)
Domestic return (t)	0.270	1.149	0.036	0.212	0.367	0.297
	(10.8)	(14.1)	(1.0)	(9.2)	(8.4)	(7.3)
Domestic return (t-1)	0.117	-0.155	0.229	0.080	0.572	0.214
	(4.4)	(1.7)	(6.7)	(3.3)	(12.5)	(5.1)
Domestic return (t-2)	0.006	0.095	-0.013	0.032	-0.019	-0.017
	(0.2)	(1.0)	(0.4)	(1.3)	(0.4)	(0.4)
Domestic return (t-3)	0.019	-0.086	-0.050	0.028	0.057	0.015
	(0.7)	(1.0)	(1.4)	(1.2)	(1.2)	(0.3)
Domestic return (t-4)	-0.016	-0.125	-0.047	-0.014	-0.032	0.047
	(0.6)	(1.4)	(1.4)	(0.6)	(0.6)	(1.1)
Domestic return (t-5)	-0.005	-0.112	-0.051	0.008	-0.039	-0.005
	(0.2)	(1.3)	(1.6)	(0.4)	(0.8)	(0.1)
Sum, t-1 to t-5	0.121	-0.383	0.071	0.129	0.539	0.254
[p-value]	[0.035]	[0.065]	[0.291]	[0.019]	[0.000]	[0.009]
US return (t-1)	0.004	0.329	0.210	-0.002	0.298	0.491
	(0.1)	(6.4)	(5.1)	(0.1)	(5.2)	(15.5)
US return (t-1)	0.005	0.366	0.011	-0.005	-0.122	0.097
	(0.2)	(6.9)	(0.3)	(0.2)	(2.1)	(2.7)
US return (t-1)	-0.030	0.010	-0.066	0.000	0.040	0.020
	(1.0)	(0.2)	(1.6)	(0.0)	(0.7)	(0.5)
US return (t-1)	0.040	-0.002	-0.027	-0.011	-0.026	0.028
	(1.3)	(0.0)	(0.6)	(0.5)	(0.4)	(0.8)
US return (t-1)	0.030	0.099	0.056	-0.014	0.006	0.003
	(1.1)	(1.8)	(1.3)	(0.6)	(0.1)	(0.1)
Sum, t-1 to t-5	0.049	0.802	0.121	0.056	0.196	0.638
[p-value]	[0.478]	[0.000]	[0.064]	[0.341]	[0.170]	[0.000]
Adjusted R-squared	0.409	0.359	0.253	0.365	0.396	0.480
Number of observations	880	882	882	851	886	879

Table 6. Variance Decomposition of VAR Systems

This table shows estimates of the variance decomposition of three-variable vector autoregression (VAR) systems based on daily data for six East Asian equity markets over 1999-2002. The VARs include lagged US returns, domestic returns, and the net inflows of foreigners. The table shows the proportion of the variance (in per cent) of the latter two variables that is attributable to innovations in each variable 20 periods earlier. Further details of the VARs are provided in Section 3.3.

A: Proportion of the variance in net inflows explained by innovations in:

	US returns	Net inflows	Domestic returns
Indonesia (JSX)	2.31	94.48	3.21
Korea (KSE)	19.44	80.16	0.40
Korea (Kosdaq)	5.42	89.63	4.94
Philippines (PSE)	1.14	96.01	2.86
Thailand (SET)	6.79	80.71	12.50
Taiwan (TWSE)	29.17	67.51	3.32

B: Proportion of the variance in domestic returns explained by innovations in:

	US returns	Net inflows	Domestic returns
Indonesia (JSX)	5.73	11.95	82.32
Korea (KSE)	16.45	15.69	67.86
Korea (Kosdaq)	11.75	1.45	86.80
Philippines (PSE)	6.73	9.97	83.30
Thailand (SET)	8.54	8.74	82.73
Taiwan (TWSE)	7.20	6.42	86.39

Table 7. The Price Impact of the Net Purchases of Foreign Investors

This table shows the results of regression of daily returns in six Asian equity markets over 1999-2002 on the net purchases (or "flows") of foreigners and a series of control variables. Regression coefficients on the net flows variable are shown, with t-statistics in parentheses below; constants are omitted for brevity. Panel A shows the results of regressions of returns on a constant and same-day flows. The regressions for Panel B also include six control variables (the prior overnight return on the S&P 500, Nasdaq Composite and Philadelphia Semiconductor indices, and the same-day return on the Hong Kong, Singapore and Tokyo markets). The regressions for Panel C also include the control variables, and decompose net inflows into expected and unexpected flows, with expected flows defined as the fitted value from a regression similar to those in Table 5, but including only those variables predetermined at the end of the previous domestic trading day. The regressions for Panel D include the control variables, contemporaneous unexpected flows, and unexpected flows over the previous five days. In the case of lagged unexpected flows, the table shows the sum of the five regression coefficients and the t-statistic on the hypothesis that this sum is equal to zero. The adjusted R-squared and sample size from the regressions in Panel B are shown at the bottom of the table.

Coefficient on:	JSX	KSE	Kosdaq	PSE	SET	TWSE
A: Regressions of returns on a constant and net flows						
Net flows	0.381	0.183	0.149	0.391	0.202	0.217
	(11.1)	(17.4)	(4.7)	(9.4)	(10.0)	(10.8)
B: Regressions of returns on a constant, net flows, and control variables						
Net flows	0.360	0.119	0.067	0.356	0.142	0.161
	(11.1)	(11.9)	(2.3)	(9.0)	(7.9)	(7.3)
C: Regressions of returns on a constant, unexpected flows, expected flows, and control variables						
Unexpected flows	0.424	0.128	0.021	0.409	0.163	0.163
	(10.7)	(12.2)	(0.6)	(8.6)	(7.4)	(6.1)
Expected flows	0.234	0.052	0.216	0.239	0.101	0.157
	(4.2)	(1.8)	(3.7)	(3.4)	(3.2)	(4.2)
D: Regressions of returns on a constant, unexpected flows, five lags of unexpected flows, and control variables						
Unexpected flows	0.428	0.127	0.022	0.414	0.166	0.160
	(10.8)	(12.0)	(0.7)	(8.6)	(7.5)	(6.0)
Lagged unexpected flows	0.235	0.007	0.164	0.176	0.177	0.187
	(2.6)	(0.3)	(2.2)	(1.6)	(3.7)	(3.7)
Adjusted R-squared from regn. in Panel B	0.219	0.450	0.234	0.181	0.321	0.182
Number of obs.	880	882	882	851	886	879

Table 8: The Reaction of Local Stock Returns to Global Returns

This table provides simple estimates of the responsiveness of domestic stock returns in six East Asian equity markets over 1999-2002 to movements to global returns, over 1999-2002. The equation estimated is as follows:

$$r_{i,t-20,t} = a_{io} + a_{i1} r_{w,t-21,t-1} + \varepsilon_{i,t}$$

where $r_{i,t-20,t}$ is the 20-day return in market *i* to day *t*, and $r_{w,t-21,t-1}$ is the 20-day return on the MSCI World index to day *t-1*. The table shows estimates of the parameter a_1, with t-statistics shown in parentheses. The equation is estimated using overlapping returns data, and Newey-West standard errors are used to take account of the moving-average error process that is introduced.

	Indonesia (JSX)	Korea (KSE)	Korea (Kosdaq)	Philippines (PSE)	Thailand (SET)	Taiwan (TWSE)
Response of local returns	0.54	1.42	1.91	0.57	0.86	0.97
to global returns	(2.8)	(8.9)	(6.3)	(3.3)	(4.7)	(5.3)

Table 9. Estimates of Average Returns on Days with Net Inflows and Net Outflows

This table shows estimates of average percentage returns and average percentage abnormal returns in six East-Asian emerging equity markets over 1999-2002, with the sample divided into days when foreigners were net purchasers or net sellers. Abnormal returns are calculated as the residual from a regression of returns on control variables (a constant; the lagged domestic return; lagged returns on the S&P 500, Nasdaq, and Philadelphia Semiconductor indices; and the same-day return in Hong Kong, Singapore and Tokyo). For comparison, the memo item shows related estimates of abnormal returns for the US equity market, taken from Edelen and Warner (2001) who study the relationship between market-level returns and flows into and out of mutual funds.

	Raw returns on days with:		Abnormal returns on days with:	
	Net inflows	Net outflows	Net inflows	Net outflows
Indonesia (JSX)	0.28	-0.48	0.24	-0.41
Korea (KSE)	0.89	-1.04	0.47	-0.56
Korea (Kosdaq)	0.23	-0.40	0.03	-0.04
Philippines (PSE)	0.32	-0.35	0.29	-0.21
Taiwan (TWSE)	0.33	-0.69	0.19	-0.32
Thailand (SET)	0.52	-0.39	0.29	-0.21
Median for six markets	0.33	-0.44	0.27	-0.26
Memo item: US estimates of abnormal returns on days of net flows into and out of mutual funds, from Edelen and Warner (2001)			0.25	-0.25