Institutional Portfolio Flows and International Investments

Kenneth A. Froot
Harvard Business School and NBER

Tarun Ramadorai
University of Oxford Saïd Business School, Oxford-Man Institute for Quantitative Finance, London Business School, and CEPR

Using a new technique, and weekly data for 25 countries from 1994 to 1998, we analyze the relationship between institutional cross-border portfolio flows, and domestic and foreign equity returns. In emerging markets, institutional flows forecast statistically indistinguishable movements in country closed-end fund NAV returns and price returns. In contrast, closed-end fund flows forecast price returns, but not NAV returns. Furthermore, institutional flows display trend-following (trend-reversing) behavior in response to symmetric (asymmetric) movements in NAV and price returns. The results suggest that institutional cross-border flows are linked to fundamentals, while closed-end fund flows are a source of price pressure in the short run. (*JEL* G15, F21, G11)

There is a considerable debate about the relationship between international portfolio flows, and domestic and foreign equity prices. Past research shows that the transactions of international investors positively impact current and future stock returns in a range of developed and emerging markets.[1] However, there is a disagreement about the economic determinants of this empirical observation. There is also a consensus that cross-border flows exhibit trend-following in response to local equity returns, but there is little evidence on how measures of value in local *and* distant markets impact investor decisions.[2] Finally, while twin securities such as closed-end country funds (which provide

---

We are grateful to State Street Bank for their help in obtaining data and Harvard Business School for financial support. We have benefited from the comments of participants in the Finance Workshop at Harvard University, the NBER Conference on the Management of Currency Crises, the European Financial Management Association meetings, and an anonymous referee. We thank John Campbell, Pablo Casas-Arce, Xavier Debrun, Alexander Guembel, Joel Hasbrouck, Pete Kyle, André Perold, Joshua Pollet, Jeremy Stein, René Stulz, Linda Tesar, and Joshua White for useful conversations and helpful comments. The views expressed here are ours, and we alone bear responsibility for any mistakes and inaccuracies. Address correspondence to Kenneth A. Froot, Harvard Business School and NBER, Boston, MA 02163; telephone: 617-495-6677; e-mail: kfroot@hbs.edu.

[1] Tesar and Werner (1994, 1995) and Brennan and Cao (1997) find that over quarterly intervals, international prices tend to rise (fall) when there are cross-border equity inflows (outflows). Froot, O'Connell, and Seasholes (2001) use daily data and show that at least some of the increase in prices occurs *after* cross-border equity purchases.

[2] See, for example, Stulz (1999) and Froot, O'Connell, and Seasholes (2001) for evidence of trend-following. Griffin, Nardari, and Stulz (2004) show that cross-border flows are both "pulled" by international equity returns and "pushed" by U.S. market returns.

© The Author 2008. Published by Oxford University Press on behalf of the Society for Financial Studies. All rights reserved. For permissions, please e-mail: journals.permissions@oxfordjournals.org.
doi:10.1093/rfs/hhm091 Advance Access publication January 30, 2008

one price in the domestic market and another in the foreign market for the same underlying set of cash flows) have been extensively studied in the finance literature, the relationship between these asset prices and flows in both markets has not been examined.[3]

There are two idealized explanations for why cross-border flows predict domestic stock returns. The first, which we term the "price pressure" explanation, is that foreign investors generate movements in equity returns that are unrelated to underlying fundamentals. In models such as Frankel and Froot (1987); DeLong et al. (1990); Barberis and Shleifer (2003); and Hong and Stein (2003), the reliable trading pattern of a group of investors (e.g., positive feedback trading) temporarily soaks up available liquidity for an asset. This pushes the asset price temporarily away from its fundamental value. However, as additional liquidity arrives, this transitory effect is undone, and the asset price reverts to fundamental value.

The second, which we term the "information" explanation, is that foreign investors are more informed than domestic investors. Foreign investors perceive relevant fundamentals better than domestic investors, and effect purchases or sales when they anticipate movements in these fundamentals. When fundamentals are later revealed, equity prices adjust to their new level. Thus, international portfolio flows predict returns. The information view stands in contrast with evidence that finds that domestic investors are better informed than foreign investors (see Kang and Stulz, 1997; Choe, Kho, and Stulz, 1999, 2001; Griffin, Nardari, and Stulz, 2004; Dvorak, 2005). However, Seasholes (2004) finds evidence that in the equities of large, well-known firms in emerging markets, foreign investors appear to do better than domestic investors.

Several papers attempt to distinguish between these idealized views by testing whether flow-predicted price movements are temporary or permanent. Naturally, temporary movements are identified with price pressure, while permanent movements are interpreted as evidence of asymmetric information. Bekaert, Harvey, and Lumsdaine (2002), for example, find that positive shocks to flows generate short-term price increases that partially persist over longer horizons. This is supported by the evidence in Clark and Berko (1997), who cannot detect much mean reversion in equity price movements resulting from unexpected foreign flow shocks. However, this kind of evidence on long-term price behavior is inconclusive for at least two reasons. The first is the usual argument that long horizon tests suffer from a lack of statistical power and imprecise size. The second is an even greater problem: changes in fundamentals can themselves cause temporary price changes through movements in expected returns. For example, a decline in current risk will typically increase current prices and reduce expected returns. This implies that the price change has a transitory component as long-run prices increase less than current

[3] See Hardouvelis, LaPorta, and Wizman (1994); Bodurtha, Kim, and Lee (1995); and Frankel and Schmukler (1996, 2000).

prices. As a result, even if a test could determine that certain price changes are temporary, it cannot decisively separate the information and price pressure views.

Because of these problems, we seek to separate information and price pressure without relying on follow-on prices. We accomplish this by using a class of equivalent securities that trade in different locations: closed-end country funds.[4] As is well known, these securities have the same underlying cash flows, but may be subjected to different sources of transient price pressure. Their prices are determined in New York and their net asset values (NAVs) are determined in local country equity markets. Much previous work has shown that closed-end fund price and NAV do not move in lockstep. This suggests that nonfundamental factors may be important in explaining relative price movements. We use flow of information into closed-end fund and NAV assets, respectively, as proxies for the demand shocks to which each of these assets is exposed. We then ask whether flows into the underlying NAV assets are as useful for explaining closed-end fund price changes as they are for explaining NAV changes. Reciprocally, we ask whether flows into the closed-end fund are as useful for explaining NAV changes as they are for explaining closed-end fund price changes. In other words, do these measures of flows—proxies for price pressure–help for understanding the well-documented and surprisingly large fluctuations in the difference between NAV and price, i.e., the closed-end fund discount?

Naturally, our null hypothesis is that the flows contain no information about either closed-end fund price or discount changes. The alternatives are several. First, if flows are important in explaining price changes, but not discount movements, then segmented-market prices respond similarly to flows into a single market. Flows move the price of the asset being purchased, as well as its "twin," which trades in a distant, partially segmented market. This would seem consistent with the information story and reduces the case for return predictability being driven by price pressure. Alternatively, if flows into the asset being purchased are more helpful for explaining its price movements than those of its twin, and, furthermore, if these flows are helpful for explaining discount changes, then flows would indeed seem to be at least partially associated with the disparity between local versus distant price pressure. In its idealized form, this twin-based experiment offers a clean prediction: the return differential between locations (i.e., the change in the closed-end fund discount) should not be forecastable by flows into the underlying assets under the information hypothesis, but should be forecastable under the price pressure hypothesis.

Now, of course, our experiment is far from ideal. We try to control for intrinsic value by selecting a paired asset with identical cash flows. Of course, even if the cash flows are identical, fundamental values may differ between the closed-end fund on the NYSE and the foreign equity market because of

[4] It is also possible to use a variety of "Siamese twin" securities, as in Froot and Dabora (1999).

segmentation in discount rates, expectations, and transaction costs. So our pairing of assets reduces, but probably does not eliminate movements in the discount from changes in fundamental value. Moreover, we can only identify price pressure under the assumption that local asset flows, not distant asset flows, are what exert price pressure on the local asset. In principle, this need not be the case–it is possible that market makers worldwide see distant market flows (and possibly specific distant market movements) as evidence of price pressure in their local asset market. If so, then market-specific price pressures would nevertheless be spread to related assets around the world. While we believe that distant-market flows are not observable over short horizons and that there is at least some market segmentation (arguably this is the *raison d'etre* for closed-end country funds in the first place), we nevertheless grant that prices even across segmented markets could react uniformly to flows into a specific market for reasons other than fundamentals.

While imperfect, our experimental setup does leave us in a good position to study the relationship between flows and returns in a context where much fundamental variation has been removed. So we can use this setup to investigate two other important questions. First, do measures of value in both domestic *and* foreign markets predict cross-border flows? There is considerable evidence that flows exhibit trend-following, but not much is known about the specific return information on which investor decisions rely. Second, do flows into the closed-end fund in New York move NAV and price returns equivalently, or do they move NAV returns more? Closed-end fund discounts have often been linked to sentiment, but there is sparse evidence examining the behavior of NAV and price returns in relation to measures of investor demand.

Our tests yield three main results. First, the responses of price and NAV returns to cross-border flow shocks are positive, statistically significant, and roughly of the same magnitude. We interpret this as favoring the information hypothesis. Second, cross-border flows are trend-following in response to absolute return shocks (i.e., equal movements in closed-end fund price returns and NAV changes), but exhibit trend-reversing behavior subsequent to relative return shocks (i.e., changes in the closed-end fund discount). Assuming that discounts are mean reverting, there is some evidence that cross-border flows are linked to rationally computed expected returns. When local market equity returns increase, institutional investors buy, but only if the increase is accompanied by an equivalent movement in the returns of a distant asset with the same underlying fundamentals. If the price of the latter asset does not increase, then institutional investors sell rather than buy. Third, closed-end fund flows significantly predict closed-end fund price returns. In contrast to the behavior of cross-border flows, however, the results suggest that the closed-end fund price return predictability is primarily driven by short-run price pressure rather than information. All the results are strongest in the emerging markets in our sample. They hold both in and out of the Asian crisis years. They are also robust to different constructions of closed-end fund flows and different orderings of the variables in our vector autoregressive system.

Our finding in favor of the information hypothesis is consistent with Seasholes (2004), who finds that foreign investors perform better than domestic investors in the equities of large, well-known firms in emerging markets. However, our results contrast with those of Kang and Stulz (1997); Choe, Kho, and Stulz (1999, 2001); Griffin, Nardari, and Stulz (2004); and Dvorak (2005), who find evidence that domestic investors are better informed than foreign investors. One possible explanation for these seemingly contradictory findings is that foreign investors have a better ability to predict the equity premium in local markets, whereas domestic investors have an informational advantage in predicting cross-sectional differences in equity prices.[5]

Our finding that cross-border flows exhibit trend-following (trend-reversing) in response to absolute (relative) return shocks is related to the results in Cohen, Gompers, and Vuolteenaho (2002), and Froot and Ramadorai (2005) despite important differences in methodology and sample. The first paper analyzes the quarterly equity flows of U.S. institutional investors and quarterly U.S. equity returns, while the second analyzes the interactions between institutional investor flows and currency excess returns. Both papers decompose returns into temporary and permanent components using vector autoregressive (VAR) systems, and find trend-following by institutional investors subsequent to permanent return shocks and strong trend-reversing effects subsequent to temporary return shocks. The institutional cross-border investors in our sample seem to behave in a similar stabilizing fashion. Our approach has the added advantage of sidestepping the specification issues inherent in the model for expected returns embedded in the VAR decomposition.

Finally, our result that closed-end fund flows forecast price returns is related to the literature on the determinants of closed-end fund discounts. These discounts have often been associated with individual investor sentiment (see Lee, Shleifer, and Thaler, 1991; Chopra et al., 1993; Bodurtha, Kim, and Lee, 1995; Frankel and Schmukler, 1996, 2000), although there is little evidence connecting individual investor demand to closed-end fund discounts. Indeed, Warther (1995) does not detect any relationship between aggregate inflows into mutual funds and closed-end fund discounts. However, Gemmill and Thomas (2002) show that monthly flows by retail investors into U.K. closed-end funds forecast movements in discounts.[6] In our data, closed-end fund discounts are forecasted most precisely by large trade flows, which have been associated with changes in institutional ownership in common stocks.[7] This seeming inconsistency with

[5] We thank an anonymous referee for this suggestion.

[6] The association of unit trusts and investment funds (AUTIF) in the UK classifies fund flows as retail and institutional, although there is a little detail about the precise classification procedure they employ.

[7] See Campbell, Ramadorai, and Schwartz (2007) for a detailed analysis of the relationship between the 13-F filings of institutional investors and size classified TAQ flows in U.S. common stocks.

Gemmill and Thomas can be resolved if retail investors in closed-end funds utilize larger trade sizes than retail investors in common stocks. In support of this, surveys conducted by the Investment Company Institute (the national association of U.S. investment companies) reveal that U.S. households investing in closed-end funds have approximately three times as much financial wealth as the average U.S. mutual fund investor. However, our results should be interpreted with caution, as trade size-classified order flow measures are noisy measures of investor-group demand, rendering exact identification a difficult exercise.

The remainder of the paper is structured as follows. Section 1 describes the data used in the study, and Section 2 outlines the methodology. Section 3 presents and discusses the results from our estimation, and Section 4 concludes.

1. Data

1.1 International portfolio flow data

Our cross-border portfolio flows are derived from the accounting and performance systems of State Street Corporation (SSC). SSC is one of the world's largest global custodians, with nearly 40% of the U.S. mutual fund industry's assets under custody (making it the largest U.S. mutual fund custodian), and 37% of U.S. tax-exempt assets in the pension market in 2006. It has approximately seven trillion U.S. dollars worth of securities under custody. SSC records all transactions in traded instruments, including cash, underlying securities, and derivatives wherever they are held. The transactions we use include all those by SSC clients, primarily large institutional investors, in underlying equities. From this database, we distinguish cross-border equity transactions by observing the currency in which they are settled. For example, our cross-border Thai equity flows are constructed from all equity purchases and sales in SSC's universe of transactions that settle in baht, with the exception of transactions initiated by Thai investors. These weekly cross-border flow data are proprietary, and the primary public source of such data, U.S. treasury's cross-border transactions (TIC) data have only been available (at the monthly frequency) from 2002.

Given that institutional investors represent a large share of cross-border activity, it is unsurprising that these flow data appear to be representative of *total* cross-border flows country by country—they have a monthly correlation of between 68% and 75% with total foreign net equity inflows in countries where these data are available, such as Thailand and Japan. Froot, O'Connell, and Seasholes (2001) present a more detailed description of these data.

We use the flow data for 25 countries for which we have weekly closed-end country fund data. We group these countries into two categories—the developed markets: Australia, Austria, Germany, Ireland, Italy, Japan, Spain, and Switzerland; and the emerging markets: Argentina, Brazil, Chile, India, Indonesia, Israel, Korea, Malaysia, Mexico, Pakistan, Philippines, Portugal, Singapore, South Africa, Taiwan, Thailand, and Turkey.[8] The sample period is August 12, 1994 through December 24, 1998. Net flows into each country are computed as the difference between gross purchases and sales on a weekly basis. To scale the flows, denoted by $f_{i,t}$, we divide by MSCI equity market capitalization, $m_{i,t}$, and write $F_{i,t} = f_{i,t}/m_{i,t}$.

Table 1 shows that, on average, cross-border flows have been positive in the countries represented in the data. Over the sample period, SSC institutional investors have been purchasing around 35 basis points per annum of developed country equity, and around 30 basis points of emerging market equity. The weekly standard deviation of these flows is quite high, approximately three and half times the weekly mean for both developed and emerging markets, on average. This flow volatility has been the proximate cause of concern for many emerging markets–foreign portfolio flows are often characterized as "hot money" in popular press accounts.

1.2 Closed-end fund data

Our data on 39 closed-end country funds correspond to our sample of 25 countries, and are drawn from CDA Wiesenberger's closed-end fund database. We select only those funds that trade on the NYSE and/or AMEX. The database is free of survivorship, including failed funds. There are 229 weeks during the sample period, and a total of 8,919 fund-week observations (the Fidelity Advisor Korea Fund, has a later start date than the others, and there are two missing NAV observations for the ROC Taiwan Fund).

Table 1 shows that for all funds, there are large differences between the mean NAV return (change in log NAV) and the mean price return (change in log price). Weekly price returns and NAV returns are also highly volatile, with the volatility of price returns almost always higher than the volatility of NAV returns. These observations are consistent with the many studies in the literature on the existence and variability of the closed-end fund discount (the difference between log NAV and log price).

1.3 Closed-end fund flow data

We construct measures of flows into the closed-end funds, using data from the NYSE's Transactions and Quotes (TAQ) database. The database records the transaction price and quantity for every trade, but does not classify the direction of any trade. For all NYSE and AMEX trades in our closed-end funds, we extract trade prices, number of shares, and innermost prevailing bid/ask quotes.

To classify the direction of each trade, we use a matching algorithm suggested by Lee and Ready (1991). The algorithm uses the distance between

[8] The results for geographical subgroups such as emerging East Asia and Latin America are qualitatively very similar. These results are available on request.

Table 1
Summary statistics

	μ(F) bp	σ(F) bp	μ(NOI) bp	σ(NOI) bp	$\mu(r^N)$ pp	$\sigma(r^N)$ pp	$\mu(r^P)$ pp	$\sigma(r^P)$ pp	ρ(F, NOI)
Developed markets									
First Australia Fund	0.33	1.02	19.09	11.88	−0.13	2.31	−0.21	3.10	0.05
Austria Fund	0.54	3.39	0.26	0.30	0.04	2.24	0.03	2.93	−0.05
Germany Fund	0.51	1.61	0.26	0.20	0.06	3.44	0.07	3.53	0.12
New Germany Fund	0.51	1.61	23.13	11.85	0.03	2.87	0.01	3.50	0.13
Irish Investment Fund	1.93	3.50	24.54	22.52	0.32	2.09	0.33	3.66	0.03
Italy Fund	0.81	1.92	28.33	22.38	0.22	3.03	0.16	3.47	−0.05
Japan Equity Fund	0.40	0.84	35.55	25.02	−0.38	2.90	−0.37	4.45	0.19
Japan OTC Equity Fund	0.40	0.84	34.78	21.66	−0.38	2.77	−0.41	4.57	0.03
Spain Fund	0.20	1.35	25.03	17.84	0.34	2.60	0.30	3.26	0.08
Swiss Helvetia Fund	0.58	2.41	18.86	16.16	0.26	2.50	0.19	2.64	0.04
Emerging markets									
Argentina Fund	0.19	1.14	27.56	20.20	−0.04	3.83	−0.18	4.87	0.06
Brazil Fund	0.52	4.00	34.74	23.72	−0.20	4.71	−0.33	5.81	−0.07
Brazilian Equity Fund	0.52	4.00	53.61	35.97	−0.60	6.15	−0.74	7.18	−0.03
Chile Fund	0.07	0.22	0.11	0.24	−0.24	3.28	−0.34	4.17	−0.15
India Fund	0.12	0.51	25.32	17.26	−0.25	3.01	−0.33	4.66	0.09
India Growth Fund	0.12	0.51	31.67	23.22	−0.35	3.43	−0.52	4.46	0.06
Jardine Fleming India Fund	0.12	0.51	32.13	26.65	−0.36	3.28	−0.46	4.77	0.02
Morgan Stanley India Investment Fund	0.12	0.51	19.05	15.79	−0.23	3.05	−0.34	4.83	−0.13
Indonesia Fund	0.79	1.94	50.51	33.91	−0.59	7.19	−0.55	6.92	−0.10
Jakarta Growth Fund	0.79	1.94	31.13	24.83	−0.61	5.57	−0.63	6.63	0.06
First Israel Fund	0.29	1.01	21.71	18.38	0.12	2.73	−0.06	3.76	0.08
Fidelity Advisor Korea Fund	0.86	2.44	39.74	39.00	−0.34	6.29	−0.47	5.93	0.27
Korea Equity Fund	0.86	2.44	34.93	32.82	−0.43	5.70	−0.50	5.55	0.29
Korea Fund	0.86	2.44	42.82	33.47	−0.32	5.75	−0.43	6.32	0.30
Korean Investment Fund	0.86	2.44	48.37	38.24	−0.46	6.50	−0.57	5.90	0.24
Malaysia Fund	0.34	1.67	37.68	28.26	−0.91	5.55	−0.77	5.50	−0.04
Mexico Equity & Income Fund	0.38	1.15	24.80	21.54	−0.47	5.34	−0.62	5.89	0.09
Mexico Fund	0.38	1.15	31.85	23.66	−0.33	5.69	−0.47	5.82	0.17
Pakistan Investment Fund	1.06	2.05	28.12	25.78	−0.74	4.17	−0.76	4.98	0.00
First Philippine Fund	0.93	1.84	0.46	0.57	−0.54	4.69	−0.56	5.03	−0.20
Portugal Fund	1.58	4.50	35.85	27.99	0.19	2.68	0.14	3.72	0.00
Singapore Fund	0.49	1.72	32.07	25.71	−0.34	3.25	−0.45	4.46	0.14
Southern Africa Fund	0.58	0.70	22.84	20.46	−0.15	3.45	−0.15	3.92	0.06
ROC Taiwan Fund	0.13	0.35	26.47	21.60	−0.28	4.00	−0.32	5.36	−0.06
Taiwan Equity Fund	0.13	0.35	36.98	28.83	−0.08	4.08	−0.19	4.60	−0.07
Taiwan Fund	0.13	0.35	34.99	40.11	−0.27	4.14	−0.38	5.27	−0.05
Thai Capital Fund	0.77	2.06	36.44	30.11	−0.80	5.09	−0.68	6.23	0.08
Thai Fund	0.77	2.06	38.90	25.87	−0.96	5.92	−0.69	6.17	0.04
Turkish Investment Fund	0.57	1.63	37.71	30.92	0.02	6.06	−0.20	5.69	0.05

This table presents descriptive statistics for cross-border equity flows (purchases less sales), the change in log closed-end country fund NAV (NAV returns), and change in log closed-end country fund price (price returns) and TAQ net order imbalances (NOI) for 39 NYSE- and AMEX-traded funds from 25 countries from August 12, 1994, to December 24, 1998. The closed-end fund net order imbalance data are derived from the TAQ database of the NYSE, which reports all trades and quotes in each individual stock. Fund names are in rows. The first two columns report the mean (μ) and standard deviation (σ) of the net weekly cross-border flow in basis points of the previous week's country market capitalization as reported by MSCI. The third and fourth columns report the weekly μ and σ of the TAQ net order flow imbalance in basis points of the fund's prior week market capitalization (as reported in CRSP). The fifth and sixth columns report the weekly μ and σ of the NAV return in percentage points. Columns seven and eight report the weekly μ and σ of the change in the price return in percentage points. Column nine reports the correlation between the cross-border flow and the NOI for each fund.

the trade price and the lagged quote midpoint to sign transactions as buyer-initiated or seller-initiated. Having signed individual trades, we aggregate them in several ways. Our first measure of closed-end fund demand is the net order flow imbalance (all classified buys less all classified sells) in the shares of each of the closed-end funds. Chordia, Roll, and Subrahmanyam (2002), and Chordia and Subrahmanyam (2004) find evidence that order flow imbalances have forecasting power for the returns of stocks on the NYSE, and Sias (1997) finds that order flow imbalances are useful for forecasting closed-end fund price returns. In recent papers, Shanthikumar (2004) and Hvidkjaer (2006) find that large (small) trade flows are correlated with changes in institutional (retail) ownership of individual stocks, and that these flows are useful in explaining stock returns. Therefore, we aggregate all trades greater than $20,000 and less than $5,000 in the shares of the closed-end funds, to create large trade and small trade flows as our second set of measures of closed-end fund demand.[9]

We then normalize the daily flow measures, dividing them by daily fund market capitalization taken from Center for Research in Security Prices (CRSP). This controls for mechanical jumps in share flows due to corporate actions, such as stock splits and share buybacks. The daily normalized flows are then cumulated to form weekly observations.

Large (small) trade flows have been identified with institutional (retail) investor trading behavior. However, for the emerging market funds in the sample, Table A.1 shows that the average correlation between changes in institutional ownership (as reported in SEC 13-F filings) and large trade flows is negative 4.9%. The average correlation (computed using the information in Table 1) between the NOI and the SSC institutional cross-border flows is also low, at 5.7% (4.1%) for the developed (emerging) country funds. Table A.2 presents evidence from the May 1998 Investment Company Institute *Annual Mutual Fund Tracking Survey* and the *1998 Profile of Mutual Fund Shareholders*. The table reveals that in 1998, the median U.S. household owning a closed-end fund had approximately $250,000 in financial wealth, as compared to $80,000 for the median U.S. household that owns any mutual fund. Furthermore, in 1998, 30% of the primary investors in households owning closed-end funds had completed graduate school, as opposed to 18% for all households owning mutual funds. These figures are very similar to those reported in the surveys conducted between 1999 and 2005. If financial wealth and sophistication are positively correlated with trade size, (standard assumptions in the literature that attempts to separate institutional from individual trades) retail investors in closed-end funds could employ larger trade sizes than retail investors in other equities. It

[9] We also computed measures of institutional and individual investor flow using the method of Campbell, Ramadorai, and Schwartz (2007). Our results on price pressure versus information of cross-border flow are unchanged with the incorporation of this variable. However, the flow measures we use in this paper yield more precise statistical forecastability of the closed-end fund price return. The appendix contains more details about the construction of all the flow measures used in the paper.

is worth noting here that in general, drawing inferences about investor group demand using trade size is a tricky proposition, given the amount of noise in trading volume data.

Table 1 reveals that the mean and volatility of the NOI is much greater than that of the cross-border flows. This may reflect the fact that the NOI represents the entire excess of buyer-initiated over seller-initiated orders in the closed-end fund, while the cross-border flows contain a small fraction of institutional turnover in local countries. The table also reveals that there are considerable differences in the size and variability of the NOI across different funds operating in the same country. Therefore, to make the TAQ and cross-border flows cross-sectionally comparable, we multiply the TAQ flow measures by the relative standard deviations of the normalized cross-border flows on a fund-by-fund basis. For example, the NOI for each fund i is multiplied by $\sigma_{f_i}/\sigma_{NOI_i}$.[10]

2. Methodology

2.1 The country-level flow-return relationship

Froot, O'Connell, and Seasholes (2001), and Seasholes (2004) present evidence of bivariate causality between international portfolio flows and equity returns in a variety of global markets. We begin by documenting the relationship between cross-border flows and closed-end fund NAV returns in our data. We run country-level regressions, conditioning the NAV return[11] (using the market capitalization-weighted NAV return series across all funds in each country) and cross-border flows on their own and each other's lagged values:

$$r_t^N = \alpha + \sum_{k=1}^{3} \gamma_k F_{t-k} + \sum_{k=1}^{3} \beta_k r_{t-k}^N + u_t. \tag{1}$$

$$F_t = \kappa + \sum_{k=1}^{3} \phi_k F_{t-k} + \sum_{k=1}^{3} \eta_k r_{t-k}^N + u_t. \tag{2}$$

2.2 The predictive ability of cross-border flows

Our next step is to stack the funds into two panels: developed and emerging, in an effort to gain statistical power. We estimate four equations. The first simply conditions the NAV return on the lagged NAV return:

$$r_{it}^N = \alpha_i + \sum_{k=1}^{3} \beta_k^{spec1} \left(r_{it-k}^N\right) + u_{it}. \tag{3}$$

[10] Our results are qualitatively unchanged by the use of this normalization. They simply make the coefficient magnitudes on TAQ flows and cross-border flows comparable, facilitating interpretation.

[11] We also regressed the cross-border flow on three weekly lags of MSCI country index returns rather than the NAV return. The results are very similar.

Next, we condition the NAV return on lagged cross-border flows:

$$r_{it}^{N} = \rho_i + \sum_{k=1}^{3} \gamma_k^{spec2} \left(F_{it-k}\right) + u_{it}. \tag{4}$$

We then condition the NAV return on both lagged flows and lagged NAV returns, to gauge the additional forecasting power contributed by cross-border flows in excess of Equation (3):

$$r_{it}^{N} = \kappa_i + \sum_{k=1}^{3} \beta_k^{spec3} \left(r_{it-k}^{N}\right) + \sum_{k=1}^{3} \gamma_k^{spec3} \left(F_{it-k}\right) + u_{it}. \tag{5}$$

Finally, we introduce contemporaneous cross-border flow into Equation (5), to check whether the forecasting power of lagged cross-border flow is primarily driven by forecasts of the contemporaneous price impact of cross-border flow on domestic assets:

$$r_{it}^{N} = \theta_i + \varphi\left(F_{it}\right) + \sum_{k=1}^{3} \beta_k^{spec4} \left(r_{it-k}^{N}\right) + \sum_{k=1}^{3} \gamma_k^{spec4} \left(F_{it-k}\right) + u_{it}. \tag{6}$$

The next section presents our vector error-correction model (VECM) system, our tests to distinguish between the price pressure and information hypotheses, and our method to detect the link between cross-border flows and absolute and relative return shocks.[12]

2.3 Price pressure and information

Hasbrouck (1991) presents an empirical method to identify the presence of private information in order flow. This is motivated by a microstructure model in which flows precede quote revisions by the market maker. In the model, if private information generates trade, the price impact of order flow on returns is permanent. This is empirically implemented using a bivariate VAR of order flow and returns, with one modification—the inclusion of contemporaneous flow in the return equation. The impulse response functions (IRFs) of this VAR system are identical to the orthogonalized IRFs (OIRFs) under the ordering that flows precede returns (see Hamilton, 1994). Given the underlying model, if an order flow shock generates a return response that does not revert to zero in the long run, Hasbrouck concludes that there is private information contained in the flow.

[12] It is worth noting that we use the term "predictability" to describe movements in price that are anticipated by cross-border flow, while we use the term "price pressure" to refer to the explanation of predictability (see, for example, DeLong et al., 1990) that relies on the reliable trading pattern of a group of investors to generate temporary swings of prices away from fundamentals.

Hasbrouck's (1991) VAR is run on very short horizon trading frequency data. At this horizon, stock price movements are primarily driven by cash-flow news, and it is unlikely that there is a significant variation in expected returns. At lower frequencies, however, there is a large body of evidence that there is a time variation in expected returns.[13] Revisions in expectations of future returns will have temporary rather than permanent effects on price (Campbell, 1991). This renders Hasbrouck's basic method unsuitable for the purpose of detecting private information in our sample. Our data are weekly, and our sample includes the 1997 Asian crisis, a period during which expected return variation is likely to be high.[14]

We modify Hasbrouck's (1991) framework to allow for the use of closed-end country funds and prices. Our system contains two return equations: one for the NAV return of the closed-end fund, and the other for the price return of the closed-end fund in New York. Like Hasbrouck, we inspect the OIRFs of returns to a cross-border flow shock. Unlike Hasbrouck, we do not use the reversion to zero of the NAV return OIRF as the sole conclusive test about the presence of private information in the flow. We also test whether the cross-border flow shock generates a statistically identical impulse response in the price of the closed-end fund. If so, we interpret this as evidence in favor of the information hypothesis. On the other hand, if a cross-border flow shock results in a positive NAV impulse response, but a zero price impulse response, we interpret this as evidence in favor of price pressure.

Of course, our test must account for the possibility of contemporaneous correlation of demand across markets. For example, if cross-border flow shocks are simultaneously accompanied by changes in demand for the closed-end fund in New York, we will see identical NAV and price OIRFs to cross-border flow shocks, which could be generated by price pressure in both markets. This will lead us to incorrectly infer that information is the correct explanation, unless we control for demand in New York. We do so by expanding our system to include order flow into the closed-end fund shares in New York, using both the NOI, as a summary measure of excess demand, and large and small trade TAQ flows, as described in the Data section.

Our use of closed-end funds requires a third modification. We need to keep track of the discount in any VAR, since expected future changes in NAV returns, price returns and flows may be importantly affected by the current size of the discount. Furthermore, the size of the discount will be correlated with past price and NAV returns. Therefore, we use the VECM along the lines suggested by Engle and Granger (1987).

---

[13] For an early study documenting time-variation in U.S. market expected returns, see Ferson and Harvey (1991). For evidence that international equity returns are mean-reverting, see Balvers, Wu, and Gilliland (2000).

[14] This caveat also affects tests that seek to separate information from price pressure by inspecting the mean reversion properties of flow-predicted price movements (e.g., Clark and Berko, 1997; Bekaert, Harvey, and Lumsdaine, 2002).

We estimate:

$$\begin{bmatrix} F_{it} \\ NOI_{it} \\ r_{it}^{N} \\ r_{it}^{P} \end{bmatrix} = \begin{bmatrix} \alpha_F \\ \alpha_{NOI} \\ \alpha_N \\ \alpha_P \end{bmatrix} + \begin{bmatrix} \delta_F \\ \delta_{NOI} \\ \delta_N \\ \delta_P \end{bmatrix} D_{it-1} + \begin{bmatrix} \phi^F & . & . & \phi^P \\ . & . & . & . \\ . & . & . & . \\ \pi^F & . & . & \pi^P \end{bmatrix} \cdot \begin{bmatrix} F_{it-1} \\ NOI_{it-1} \\ r_{it-1}^{N} \\ r_{it-1}^{P} \end{bmatrix} + \begin{bmatrix} \chi^F \\ \chi^{NOI} \\ \chi^N \\ \chi^P \end{bmatrix} X_t + \begin{bmatrix} \varepsilon_{it}^F \\ \varepsilon_{it}^{NOI} \\ \varepsilon_{it}^N \\ \varepsilon_{it}^P \end{bmatrix} \tag{7}$$

and

$$\begin{bmatrix} F_{it} \\ T20000_{it} \\ T5000_{it} \\ r_{it}^{N} \\ r_{it}^{P} \end{bmatrix} = \begin{bmatrix} \alpha_F \\ \alpha_{T2} \\ \alpha_{T5} \\ \alpha_N \\ \alpha_P \end{bmatrix} + \begin{bmatrix} \delta_F \\ \delta_{T2} \\ \delta_{T5} \\ \delta_N \\ \delta_P \end{bmatrix} D_{it-1} + \begin{bmatrix} \varphi^F(L) & . & . & . & \varphi^P(L) \\ . & . & . & . & . \\ . & . & . & . & . \\ . & . & . & . & . \\ \pi^F(L) & . & . & . & \pi^P(L) \end{bmatrix} \cdot \begin{bmatrix} F_{it-1} \\ T20000_{it-1} \\ T5000_{it-1} \\ r_{it-1}^{N} \\ r_{it-1}^{P} \end{bmatrix} + \begin{bmatrix} \chi^F \\ \chi^{T2} \\ \chi^{T5} \\ \chi^N \\ \chi^P \end{bmatrix} X_t + \begin{bmatrix} \varepsilon_{it}^F \\ \varepsilon_{it}^{T2} \\ \varepsilon_{it}^{T5} \\ \varepsilon_{it}^N \\ \varepsilon_{it}^P \end{bmatrix}. \tag{8}$$

Here, i and t denote funds and weeks, respectively. r_{it}^{N} is the NAV return, r_{it}^{P} is the change in the log fund price in New York (price return), D_{it-1} is the difference between log NAV and log price (the closed-end fund discount), F_{it} is the SSC cross-border flow into the country in which the fund invests in basis points of country market capitalization, NOI_{it} is the net order flow imbalance into the closed-end fund in New York constructed using the TAQ database, and expressed in basis points of country fund market capitalization, $T20000_{it}$and $T5000_{it}$ denote flows from trades greater than \$20,000 and less than \$5,000 in size, respectively, also expressed in basis points of country fund market capitalization, and the vector X_{it} comprises regressors that have been shown to be important in determining closed-end fund and related discounts. Specifically, these are contemporaneous U.S. index returns and three lagged values of the U.S. index returns.[15] We treat such index changes as exogenous with respect to discounts and flows.[16]

2.4 Trend-following, absolute returns and relative returns

Trend-following behavior by foreign investors has been reported in a variety of international equity markets (see Grinblatt and Keloharju, 2000; Karolyi, 2001; Choe, Khoe, and Stulz, 1999, 2001; Dahlquist and Robertsson, 2001; Froot, O'Connell, and Seasholes, 2001; and Kim and Wei, 2002). Furthermore, Bekaert, Harvey, and Lumsdaine (2002), and Edison and Warnock (2003) find that cross-border flows trend-follow dividend yields, not just equity returns.

While there has been much investigation of trend-following, it has concentrated on measuring trend-following in relation to own returns. We use our VECM setup to investigate trend-following in response to innovations in *absolute* returns (here intended to mean symmetric movements in price and NAV returns), as well as to innovations in *relative* returns (asymmetric movements in NAV and price returns).

2.5 A note on estimation

We run the VECM using OLS equation-by-equation for our unbalanced panels. Following Hasbrouck (1991), we orthogonalize the innovations in our VECM when computing impulse response functions, putting flows before returns. For example, in Equation (8), we order the variables in our system as follows:

$$\begin{bmatrix} u_{it}^{F} \\ u_{it}^{NOI} \\ u_{it}^{N} \\ u_{it}^{P} \end{bmatrix} = A^{-1} \begin{bmatrix} \varepsilon_{it}^{F} \\ \varepsilon_{it}^{NOI} \\ \varepsilon_{it}^{N} \\ \varepsilon_{it}^{P} \end{bmatrix}. \tag{9}$$

$$\Omega = AQA'$$

Here, the u's are the orthogonalized innovations; $\Omega = E[\varepsilon_{it}\varepsilon_{it}']$ is the variance-covariance matrix of the errors from the VECM; A is a lower triangular matrix with ones along the principal diagonal; and Q is a unique diagonal matrix with positive entries along the principal diagonal. As a robustness check, we also compute the impulse response functions under an alternative ordering: we reverse the order of the cross-border flows and the NOI in Equation (9).

In the time series regressions [Equations (1) and (2)], we employ Newey-West standard errors, which are robust to heteroskedasticity and autocorrelation

[15] See Bodurtha, Kim, and Lee (1995) and Hardouvelis, LaPorta, and Wizman (1994) for evidence on how discounts are positively correlated with local markets and negatively correlated with the U.S. market.

[16] We have estimated these equations in several ways, including and excluding the S&P returns. Inclusion makes relatively little difference in the coefficients or the standard errors (the future S&P return is essentially uncorrelated with the RHS regressors).

of up to three weekly lags. In all the panel regressions, we permit fund-specific intercepts, and compute standard errors using the method of Rogers (1983). These are heteroskedasticity and cross-correlation consistent, and robust to autocorrelation of up to three weekly lags.

Standard errors for the OIRFs are computed using the delete-cross-section jackknife estimator, in the spirit of Shao and Wu (1989).[17] The jackknife does not require normality, and is consistent in the presence of heteroskedasticity and, in this specific implementation, cross-correlation. Figures in the paper, unless labeled otherwise, present ± 2 standard error bounds computed using the jackknife.

3. Results

3.1 The country-level flow-return relationship

Table 2 presents results from estimating Equation (1) for both developed and emerging markets. There are four main points to be noted here. First, flows have forecasting power for the NAV return. This forecasting power seems primarily to be positive—the first two flow lags are always statistically positive whenever significant. This forecasting power is concentrated in the emerging countries. Among the developed countries, only Switzerland shows any evidence of return forecastability by cross-border flows. Second, there is some evidence that the third flow lag predicts declines in the NAV return, although the coefficient estimates indicate that the magnitude of the negative third flow lag coefficient is dominated by the first two lag coefficients. Taken together, the flow coefficients present an interesting picture, but an unclear one at this stage. We must investigate further to understand whether flows are predicting returns because of information or price pressure. Third, the NAV returns show evidence of autocorrelation, primarily negative at the first lag (this could be because of reversals due to illiquidity; see Campbell, Grossman and Wang, 1993), and strongly positive at lags two and three, suggesting momentum in the NAV returns. What these results make clear is that we need to control for lagged NAV returns in any regression specification. Fourth, the adjusted R^2 statistics, especially for the emerging market countries, are surprisingly high. The weekly adjusted R^2 for most emerging countries is above 1%, and in several cases (such as Singapore), these simple regressions generate 17% explanatory power. In most predictive regressions for returns, the R^2 statistics (at quarterly or even annual frequencies) are far smaller (see Goyal and Welch, 2007; Campbell and Thompson, 2005). It is worth emphasizing that apparently small statistics generate large improvements in utility for an investor that switches

[17] To compute the jackknife standard error for an estimator, we form the estimator for T delete-cross-section jackknife data samples, constructed by deleting all funds i for each time period t in T. The standard deviation of the resulting jackknife trials, appropriately scaled, is the jackknife standard error of the estimator. We also computed the standard errors using the delta method, and there are no significant differences.

Table 2
Country-level NAV return forecasting regressions

r_t^N	F_{t-1}	F_{t-2}	F_{t-3}	r_{t-1}^N	r_{t-2}^N	r_{t-3}^N	Adjusted R-squared
Developed							
Australia	−0.0014	0.0007	−0.0009	−0.0186	**0.1060**	0.0412	−0.0041
	0.0017	0.0014	0.0014	0.0877	0.0637	0.0695	
Austria	0.0002	0.0001	−0.0002	−0.0092	**0.1520**	0.0493	0.0066
	0.0007	0.0007	0.0005	0.0758	0.0845	0.0728	
Germany	0.0000	−0.0002	0.0011	− **0.1726**	0.0174	**0.0879**	0.0191
	0.0016	0.0027	0.0009	0.0719	0.0878	0.0516	
Ireland	−0.0001	−0.0003	0.0003	−0.0076	0.0643	0.0878	−0.0073
	0.0004	0.0004	0.0005	0.0734	0.0766	0.0875	
Italy	0.0015	−0.0003	−0.0017	−0.0073	0.0686	0.0718	0.0054
	0.0010	0.0009	0.0010	0.0695	0.0627	0.0691	
Japan	−0.0001	0.0023	−0.0020	−0.0092	**0.1846**	0.0478	0.0255
	0.0026	0.0024	0.0019	0.0842	0.0636	0.0609	
Spain	0.0004	0.0010	−0.0004	−0.0064	0.0564	**0.1591**	0.0122
	0.0013	0.0011	0.0011	0.0697	0.0899	0.0889	
Switzerland	**0.0029**	−0.0009	−0.0007	−0.0775	0.0675	0.0072	0.0592
	0.0013	0.0007	0.0006	0.0706	0.0761	0.0680	
Emerging							
Argentina	−0.0014	0.0007	−0.0009	−0.0186	**0.1060**	0.0412	−0.0041
	0.0017	0.0014	0.0014	0.0877	0.0637	0.0695	
Brazil	−0.0004	0.0007	0.0006	−0.1316	0.0678	0.0647	0.0098
	0.0012	0.0015	0.0008	0.0909	0.1141	0.0641	
Chile	−0.0002	−0.0001	0.0012	**−0.1488**	0.0234	**0.0993**	0.0150
	0.0015	0.0026	0.0009	0.0670	0.0703	0.0491	
India	0.0004	−0.0008	0.0001	0.0280	0.1000	**0.1364**	0.0140
	0.0007	0.0008	0.0008	0.0801	0.0769	0.0637	
Indonesia	−0.0001	0.0023	−0.0020	−0.0092	**0.1846**	0.0478	0.0255
	0.0026	0.0024	0.0019	0.0842	0.0636	0.0609	
Israel	**0.0039**	**0.0028**	**−0.0012**	−0.0681	−0.0071	0.0798	0.0841
	0.0012	0.0009	0.0006	0.1018	0.0750	0.0938	
Korea	**0.0012**	**0.0022**	**0.0013**	−0.0829	−0.0024	0.0383	0.0215
	0.0006	0.0006	0.0007	0.1015	0.0556	0.0806	
Malaysia	**0.0148**	−0.0061	−0.0015	**0.2392**	−0.0094	**0.1917**	0.0901
	0.0087	0.0092	0.0066	0.0891	0.0974	0.0769	
Mexico	0.0003	0.0029	0.0041	0.1293	0.1187	0.0096	0.0428
	0.0045	0.0032	0.0030	0.1466	0.0746	0.0847	
Pakistan	−0.0005	−0.0003	**0.0069**	**0.1253**	**0.1569**	−0.0544	0.0426
	0.0033	0.0037	0.0036	0.0593	0.0709	0.1082	
Philippines	**0.0061**	**0.0046**	**−0.0059**	**−0.1514**	**0.2457**	**0.1591**	0.1851
	0.0019	0.0017	0.0021	0.0547	0.1246	0.0682	
Portugal	**0.0053**	**0.0050**	**−0.0053**	**−0.1197**	**0.2555**	**0.1233**	0.1602
	0.0020	0.0017	0.0018	0.0499	0.1307	0.0667	
Singapore	**0.0058**	**0.0051**	**−0.0065**	**−0.1677**	**0.2591**	0.1049	0.1681
	0.0023	0.0020	0.0021	0.0588	0.1185	0.0687	
South Africa	0.0032	0.0027	−0.0003	0.0289	0.1222	−0.0438	0.0138
	0.0028	0.0052	0.0030	0.0727	0.1170	0.0732	
Taiwan	0.0101	0.0110	−0.0038	0.0407	−0.0181	0.0782	0.0065
	0.0086	0.0087	0.0052	0.0885	0.0870	0.0593	
Thailand	0.0100	**0.0137**	−0.0029	0.0502	−0.0300	0.0404	0.0063
	0.0076	0.0073	0.0059	0.0917	0.0597	0.0642	
Turkey	0.0009	−0.0006	−0.0019	0.0735	**0.1444**	0.0328	0.0159
	0.0024	0.0021	0.0017	0.0817	0.0758	0.0807	

This table presents the results of forecasting regressions for the NAV return using the cross-border flow for the developed and emerging market countries and funds in our sample. We estimate, using three weekly lags of each variable:

$$r_t^N = \alpha + \sum_{k=1}^{3} \gamma_k F_{t-k} + \sum_{k=1}^{3} \beta_k r_{t-k}^N + u_t.$$

The specifications use the market capitalization-weighted NAV return across all funds for each country, and the SSC cross-border flow into the country. All standard errors are corrected using the method of Newey and West (1987), and are robust to heteroskedasticity and autocorrelation. Coefficients that are significant at the 10% level are in bold.

from a myopic portfolio strategy to one that takes advantage of predictability. This is even more pertinent with high-frequency data across a range of markets. (See Campbell and Thompson, 2005; O'Connell, 2005, for more detailed analyses.)

Table 3 shows the results from estimating Equation (2), for both developed and emerging markets. There are just two features to note here. Cross-border institutional investor flows are highly persistent, and display strong trend-following behavior across both developed and emerging markets, consistent with the findings in the literature.

3.2 A closer look at return predictability by flows

Table 4 presents results from estimating Equations (3) through (6) for funds in both developed and emerging country panels. For the developed country funds, the analysis adds one further insight from the country-level analysis above—the coefficient on contemporaneous cross-border flows is positive and statistically significant, even though lagged cross-border flows are not significant. However, contemporaneous price impact is not the same as price pressure, as it is still possible that the contemporaneous flow-return relationship is based on informed trade. If the information pertained to cash flows, for example, this would result in a permanent price impact of a contemporaneous flow shock. In order to arrive at a more conclusive answer about price pressure versus information, we must conduct the analysis outlined in Section 2.3.

Panel B of Table 4 shows the results for the emerging country funds. The first column confirms the existence of NAV return momentum, while the NAV return reversals at the first weekly lag are no longer statistically significant in the panel. The adjusted R^2 using only lagged NAV returns is 2.5%. The second column of the table reveals that lagged cross-border flows on their own are significant predictors of future NAV returns. In this regression, the third lag of flows is not significantly negative. The third column replicates the country-level regressions of Table 2, in a panel context. The adjusted R^2 here is 3.5%. The comparison of R^2 statistics across columns reveals that the incremental explanatory power contributed by the addition of cross-border flow to the NAV return autoregression is almost 1% in the panel of all emerging countries.

Turning to the final column, it is clear that the contemporaneous flow–return relationship is strong, contributing an additional 1% in adjusted R^2 to the panel regression. However, the lagged flow coefficients are still statistically significant and positive at the first and second lags, and now statistically significant and negative at the third lag. Flow predictability of returns in emerging countries exists over and above contemporaneous price impact. Hasbrouck (1991) points out that the inclusion of lagged flow is to control for potentially delayed responses to information or trading frictions. We find that lagged cross-border flows matter in emerging countries, but not in developed countries. This is consistent with the presence of greater trading frictions in the former group.

Table 3
Country-level cross-border flow forecasting regressions

F_t	F_{t-1}	F_{t-2}	F_{t-3}	r^N_{t-1}	r^N_{t-2}	r^N_{t-3}	Adjusted R-squared
Developed							
Australia	**0.2981**	0.0265	0.1018	2.4206	−1.8691	−0.5143	**0.2981**
	0.0823	0.0753	0.0829	2.2349	2.5796	2.8312	0.0823
Austria	**0.3134**	0.0507	0.0333	15.6633	**15.6850**	5.5001	**0.3134**
	0.0993	0.1080	0.0699	10.4611	9.0159	10.6859	0.0993
Germany	**0.2320**	0.0902	**0.2255**	**13.3255**	4.2903	1.6694	**0.2320**
	0.1084	0.1234	0.0676	4.5591	3.1151	2.0621	0.1084
Ireland	**0.1836**	0.0646	0.0913	**24.9029**	9.3760	−17.7121	**0.1836**
	0.0590	0.0811	0.0679	11.4995	9.5826	15.5605	0.0590
Italy	**0.1286**	**0.1148**	0.0607	**8.3392**	**6.3321**	2.1708	**0.1286**
	0.0518	0.0622	0.0531	4.7656	3.2031	4.0669	0.0518
Japan	**0.2899**	0.1013	−0.0101	**4.7689**	4.9204	−3.2705	**0.2899**
	0.0840	0.0855	0.0673	2.4271	4.2773	2.3831	0.0840
Spain	**0.2041**	**0.2339**	0.0298	**6.9799**	−3.8610	**−5.4551**	**0.2041**
	0.0847	0.0639	0.0924	3.6208	3.7288	2.6398	0.0847
Switzerland	**0.2180**	0.0142	**0.0991**	−4.0143	4.7410	5.6222	**0.2180**
	0.0867	0.0609	0.0562	12.2551	5.1252	5.6041	0.0867
Emerging							
Argentina	**0.2981**	0.0265	0.1018	2.4206	−1.8691	−0.5143	**0.2981**
	0.0823	0.0753	0.0829	2.2349	2.5796	2.8312	0.0823
Brazil	**0.3135**	0.0360	**0.1918**	**13.4863**	**9.9497**	1.0932	**0.3135**
	0.0816	0.0990	0.0642	3.0822	3.5828	4.5576	0.0816
Chile	**0.2391**	0.0902	**0.2229**	**13.1907**	3.7986	1.7744	**0.2391**
	0.1066	0.1250	0.0674	4.6431	2.9540	2.3587	0.1066
India	**0.2069**	−0.0625	0.1024	6.7716	4.3956	**8.0005**	**0.2069**
	0.0634	0.0834	0.0758	5.2293	5.1029	4.7914	0.0634
Indonesia	**0.2899**	0.1013	−0.0101	**4.7689**	4.9204	−3.2705	**0.2899**
	0.0840	0.0855	0.0673	2.4271	4.2773	2.3831	0.0840
Israel	**0.1050**	**0.1709**	−0.0205	6.0195	0.3425	**11.3168**	**0.1050**
	0.0639	0.0482	0.0649	6.0797	3.0532	4.4400	0.0639
Korea	0.0218	**0.1850**	0.0172	7.8704	1.4229	2.4705	0.0218
	0.0448	0.0546	0.0346	5.3751	2.0916	2.5840	0.0448
Malaysia	**0.2011**	0.1756	**0.1705**	−0.0810	−0.1639	−0.3042	**0.2011**
	0.0761	0.1113	0.0813	0.3144	0.3408	0.4141	0.0761
Mexico	**0.2539**	0.0857	**0.1339**	**1.9399**	−0.2767	−4.5201	**0.2539**
	0.0624	0.0693	0.0616	1.0519	1.2950	1.4992	0.0624
Pakistan	**0.2724**	0.0819	**0.1553**	**2.3287**	−0.5285	**−2.9731**	**0.2724**
	0.0641	0.0707	0.0626	1.3168	1.0479	1.2898	0.0641
Philippines	**0.3420**	0.0927	**0.1387**	1.8278	0.4828	−0.1422	**0.3420**
	0.1061	0.1136	0.0687	3.6621	6.0546	3.7474	0.1061
Portugal	**0.3466**	0.0955	**0.1287**	2.2473	1.2385	−0.4596	**0.3466**
	0.1087	0.1167	0.0640	4.0867	5.8786	3.6103	0.1087
Singapore	**0.3466**	0.0892	**0.1352**	2.4160	0.8610	0.1077	**0.3466**
	0.1053	0.1180	0.0634	3.4507	5.1144	3.1496	0.1053
South Africa	**0.1892**	**0.1619**	**0.0988**	**4.3582**	0.9654	0.9089	**0.1892**
	0.0489	0.0726	0.0450	1.4423	1.6983	1.3539	0.0489
Taiwan	0.0056	0.0994	0.1027	0.9551	0.6355	0.2669	0.0056
	0.0897	0.0811	0.0726	0.7507	0.9005	0.6480	0.0897
Thailand	0.0039	0.1005	0.0971	**1.1969**	0.7049	0.0865	0.0039
	0.0884	0.0804	0.0720	0.6619	0.6993	0.5268	0.0884
Turkey	**0.2905**	0.0058	0.0208	5.5146	2.2258	−5.2549	**0.2905**
	0.0725	0.0726	0.0547	3.4547	3.3672	3.4632	0.0725

This table presents the results of forecasting regressions for the SSC cross-border flow for the developed and emerging market countries and funds in our sample. We estimate the equation, using three weekly lags of each variable:

$$F_t = \kappa + \sum_{k=1}^{3} \phi_k F_{t-k} + \sum_{k=1}^{3} \eta_k r^N_{t-k} + u_t.$$

The specifications use the market capitalization-weighted NAV return across all funds for each country, and the SSC cross-border flow into the country. All standard errors are corrected using the method of Newey and West (1987), and are robust to heteroskedasticity and autocorrelation. Coefficients that are significant at the 10% level are in bold.

Table 4
Pooled NAV return forecasting regressions

	r_t^N	r_t^N	r_t^N	r_t^N
		Panel A: developed		
F_t				0.0014
				0.0004
F_{t-1}		0.0006	0.0005	0.0002
		0.0003	0.0004	0.0003
F_{t-2}		0.0001	−0.0001	−0.0002
		0.0004	0.0004	0.0004
F_{t-3}		−0.0001	−0.0002	−0.0003
		0.0003	0.0003	0.0003
r_{t-1}^N	−0.0597		−0.0634	−0.0749
	0.0411		0.0409	0.0404
r_{t-2}^N	0.0875		0.0832	0.0776
	0.0501		0.0498	0.0493
r_{t-3}^N	0.0753		0.0741	0.0746
	0.0431		0.0427	0.0420
Adjusted R-squared	0.0143	0.0002	0.0135	0.0231
N	2260	2260	2260	2260
		Panel B: emerging		
F_t				0.0025
				0.0015
F_{t-1}		0.0022	0.0019	0.0016
		0.0007	0.0006	0.0008
F_{t-2}		0.0017	0.0013	0.0009
		0.0006	0.0004	0.0004
F_{t-3}		−0.0006	−0.0009	−0.0011
		0.0004	0.0005	0.0004
r_{t-1}^N	−0.0203		−0.0319	−0.0406
	0.0200		0.0186	0.0178
r_{t-2}^N	0.1381		0.1254	0.1241
	0.0225		0.0217	0.0223
r_{t-3}^N	0.0842		0.0795	0.0799
	0.0312		0.0304	0.0298
Adjusted R-squared	0.0254	0.0144	0.0348	0.0447
N	6542	6542	6542	6542

This table presents the results of pooled forecasting regressions for the NAV return for the developed and emerging market countries and funds in our sample. Panel A reports results for the pool of developed countries and Panel B reports the results for the pool of emerging markets in our sample. In columns labeled r_t^N, the left-hand side variable is the weekly NAV return, and the right-hand side variables are, successively, three weekly lags of the NAV return; SSC cross-border flows into the country in which the fund holds assets; both lagged NAV returns and lagged SSC cross-border flows; and finally, lagged flows, lagged NAV returns and contemporaneous flows. All standard errors are corrected using the method of Rogers (1983), and are robust to cross-contemporaneous correlation, heteroskedasticity, and autocorrelation. Coefficients that are significant at the 10% level are in bold.

Having documented that predictability exists, we now turn to estimates of Equations (7) and (8), in order to identify the source of predictability.

3.3 Price pressure and information

Table 5 presents results from estimating Equation (7). For the developed countries, the coefficients on lagged cross-border flows, in both the NAV and price return equations, are small and not very precisely estimated. However, for the emerging countries, it appears that cross-border flows contain predictive power for the price return, as well as for the NAV return. At the first cross-border flow lag, the NAV return is more sensitive than the price return response. At

Table 5
Vector error correction model with net order flow imbalance

	Developed				Emerging			
	F_{it}	NOI_{it}	r_{it}^N	r_{it}^P	F_{it}	NOI_{it}	r_{it}^N	r_{it}^P
$N_{it-1} - P_{it-1}$	−0.2547	−0.1173	**−0.0289**	**0.0672**	**−0.6102**	−0.3079	**−0.0139**	**0.0168**
	0.5821	0.7455	0.0120	0.0162	0.2725	0.2073	0.0072	0.0088
F_{it-1}	**0.2326**	−0.0183	**0.0005**	0.0005	**0.1374**	0.0139	**0.0015**	0.0009
	0.0496	0.0277	0.0003	0.0004	0.0399	0.0193	0.0006	0.0006
F_{it-2}	0.0634	**0.0708**	0.0000	0.0000	**0.1268**	0.0009	**0.0010**	**0.0011**
	0.0399	0.0300	0.0005	0.0005	0.0385	0.0165	0.0004	0.0005
F_{it-3}	**0.0950**	0.0096	−0.0001	0.0002	**0.0698**	−0.0072	**−0.0012**	−0.0005
	0.0327	0.0208	0.0002	0.0003	0.0252	0.0197	0.0005	0.0007
NOI_{it-1}	0.0091	**0.1828**	0.0004	0.0004	**0.0621**	**0.2632**	0.0006	**0.0012**
	0.0237	0.0315	0.0003	0.0003	0.0249	0.0259	0.0004	0.0005
NOI_{it-2}	0.0274	**0.1530**	**−0.0006**	−0.0003	−0.0072	**0.0974**	−0.0001	0.0002
	0.0244	0.0352	0.0003	0.0004	0.0242	0.0231	0.0004	0.0005
NOI_{it-3}	0.0154	0.0460	0.0000	−0.0004	0.0282	**0.1503**	−0.0007	−0.0005
	0.0172	0.0313	0.0002	0.0003	0.0260	0.0203	0.0005	0.0004
r_{it-1}^N	**7.2022**	−0.9824	**−0.1324**	**0.1527**	1.0785	**−2.9323**	−0.0499	**0.1407**
	1.9624	2.8538	0.0386	0.0526	1.5620	1.2041	0.0321	0.0413
r_{it-2}^N	**3.8390**	1.3687	0.0436	**0.1469**	−0.8317	−1.1038	0.0590	0.0711
	2.0506	1.9143	0.0491	0.0583	2.1233	1.0981	0.0500	0.0442
r_{it-3}^N	**−4.1105**	−2.8313	0.0554	**0.0835**	−1.7174	**−1.8997**	0.0550	0.0165
	1.9119	1.9897	0.0372	0.0436	1.6364	0.9607	0.0406	0.0332
r_{it-1}^P	−0.1033	−3.1874	**0.0455**	**−0.1690**	**2.3681**	0.3809	0.0132	**−0.1997**
	1.4129	2.4883	0.0278	0.0478	1.1835	0.9198	0.0399	0.0387
r_{it-2}^P	−0.6888	−1.3109	0.0141	−0.0490	1.6303	−0.8351	**0.0780**	−0.0063
	1.5974	1.8847	0.0252	0.0351	1.1745	0.7871	0.0323	0.0340
r_{it-3}^P	**3.5021**	−0.1316	−0.0230	**−0.0892**	1.9554	0.3426	0.0421	−0.0109
	1.6492	1.5775	0.0262	0.0377	1.2354	0.7695	0.0374	0.0276
Adjusted R-square	0.1031	0.0695	0.1327	0.1929	0.1019	0.1622	0.0979	0.1310
N	2260	2260	2260	2260	6542	6542	6542	6542

This table presents results from estimating the following system of equations:

$$\begin{bmatrix} F_{it} \\ NOI_{it} \\ r_{it}^N \\ r_{it}^P \end{bmatrix} = \begin{bmatrix} \alpha_F \\ \alpha_{NOI} \\ \alpha_N \\ \alpha_P \end{bmatrix} + \begin{bmatrix} \delta_F \\ \delta_{NOI} \\ \delta_N \\ \delta_P \end{bmatrix} D_{it-1} + \begin{bmatrix} \varphi^F & . & . & \varphi^P \\ . & . & . & . \\ . & . & . & . \\ \pi^F & . & . & \pi^P \end{bmatrix} \cdot \begin{bmatrix} F_{it-1} \\ NOI_{it-1} \\ r_{it-1}^N \\ r_{it-1}^P \end{bmatrix} + \begin{bmatrix} \chi^F \\ \chi^{NOI} \\ \chi^N \\ \chi^P \end{bmatrix} X_t + \begin{bmatrix} \varepsilon_{it}^F \\ \varepsilon_{it}^{NOI} \\ \varepsilon_{it}^N \\ \varepsilon_{it}^P \end{bmatrix}.$$

All data cover the period from August 12, 1994, to December 31, 1998. r_{it}^N is the NAV return, r_{it}^P is the price return in New York, D_{it-1} is the difference between log NAV and log price (the closed-end fund discount), F_{it} is the SSC cross-border flow into the country in which the fund specializes, in basis points of country index market capitalization, NOI_{it} is the net order imbalance in the closed-end fund in New York, in basis points of fund market capitalization, and X_t represents exogenous regressors (contemporaneous and three lags of the S&P500 index return: we do not report these coefficients). The number of lags p is set to 3 weeks. Estimation is by pooled OLS equation-by-equation. Coefficients are restricted to be the same across all members of each group, but idiosyncratic intercepts are permitted. Standard errors are computed using the Rogers (1983) method. These are robust to cross-contemporaneous correlation, heteroskedasticity, and autocorrelation. Coefficients that are significant at the 10% level are in bold.

the second cross-border flow lag, the same predictable component that appears in the NAV return appears in the price return. At the third flow lag, reversals in the NAV return are more strongly predictable by cross-border flows than reversals in the price return. At first glance, it would seem that there is evidence

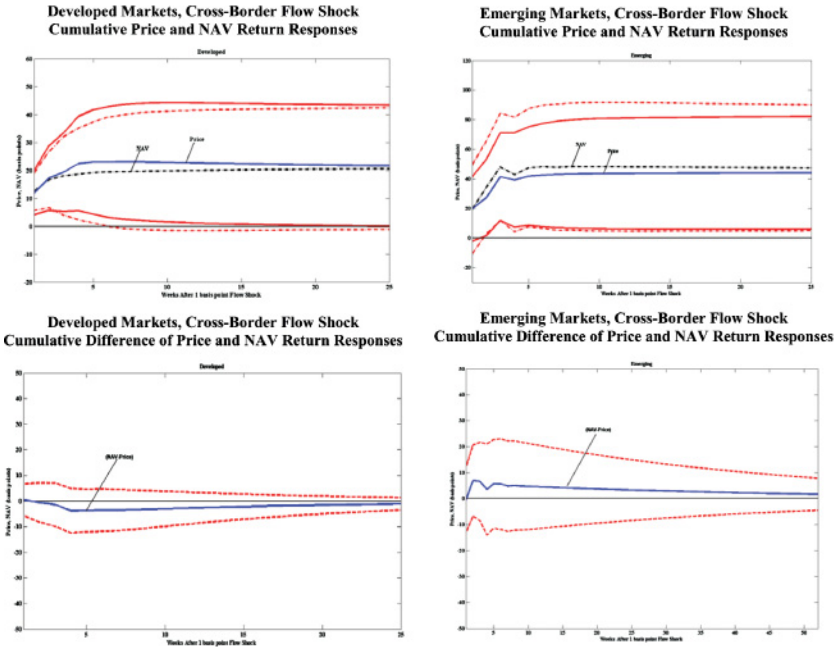

Figure 1
This figure shows the cumulative impulse responses of price and NAV returns up to 25 weeks after an unexpected 1-basis point cross-border flow shock
These impulse responses are computed using coefficient estimates from the VECM estimated in Table 5 for developed and emerging country funds. The system is orthogonalized in the order: flow, NOI, NAV return, and price return. The top panels present the cumulative impulse responses of price and NAV return on the same figure, and the bottom panels present the difference of the two impulse responses. All figures include ±2 standard deviation bounds, computed using the delete-cross-section jackknife method.

of short-term price pressure caused by the cross-border flow. However, the rationale of using the VECM is to understand the dynamics of all the complex interactions in the system. This is best summarized by the impulse response functions. To get an accurate sense of whether price pressure or information is the correct hypothesis, we must inspect the OIRFs of both price and NAV to a cross-border flow shock. As mentioned earlier, shocks are orthogonalized according to Equation (9).

Figure 1 shows the OIRFs of price and NAV returns to cross-border flow shocks. For both developed and emerging markets, both cumulative NAV and price returns rise instantaneously, and end up at the same point after 25 weeks (the impulse responses are identical over the very long run). For emerging markets, both NAV and price instantaneously rise to 20 basis points in response to a contemporaneous cross-border flow shock. Subsequently, they both rise to their long-run level of 45 basis points. These movements are statistically significant, as can be seen from the standard error bounds for the two cumulative return responses in the top panel. For up to 10 weeks following the shock, the

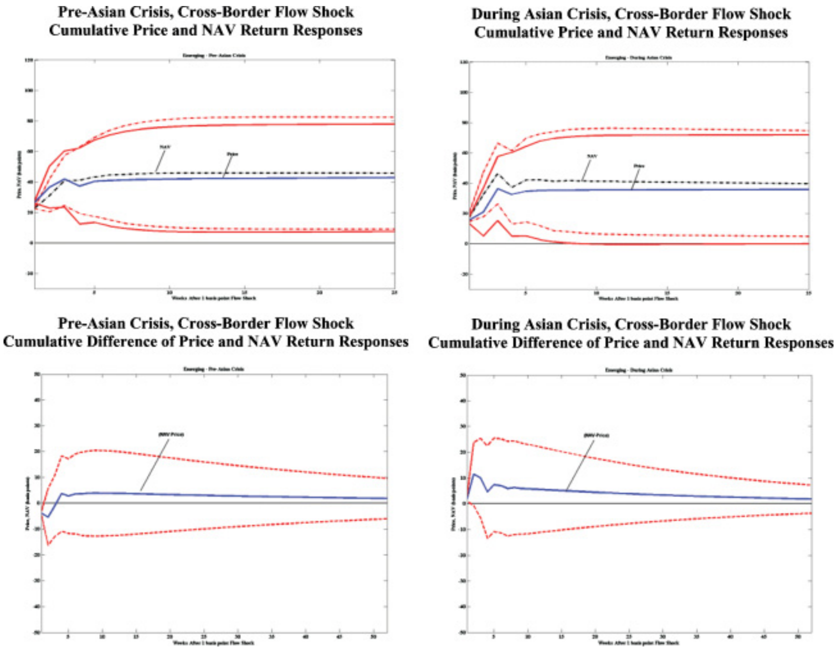

Figure 2
This figure shows the cumulative impulse responses of price and NAV returns for emerging country funds up to 25 weeks after an unexpected 1-basis point cross-border flow shock
These impulse responses are computed using coefficient estimates from separate VECM systems estimated prior to the Asian crisis (August 4, 1994, to December 26, 1996) and just before and during the Asian crisis (January 3, 1997, to December 31, 1998) for emerging country funds. Each VECM system is orthogonalized in the order: flow, NOI, NAV return, and price return. The top panels present the cumulative impulse responses of price and NAV return on the same figure, and the bottom panels present the difference of the two impulse responses. All figures include ±2 standard deviation bounds, computed using the delete-cross-section jackknife method.

NAV is greater than the price by 4 basis points, suggesting that there may be slight price pressure in the cross-border flows. However, the bottom panel of the figure shows that this initial difference between the two impulse response functions is not statistically significant at any conventional level. The results support the presence of information in cross-border flows. This is true both from the perspective of Hasbrouck (1991) (the OIRFs do not decline), and using our more stringent test (the OIRFs are statistically identical).

For the emerging country funds, we check whether our results are driven by the Asian crisis period. Figure 2 shows the OIRFs of price and NAV returns from separate VECM systems for the emerging country funds estimated in the period before the crisis (August 4, 1994, to December 26, 1996) and just prior to and during the crisis (January 3, 1997, to December 31, 1998). There does appear to be more price pressure in the first few weeks following cross-border flow shocks in the period surrounding the crisis. However, the cumulative differences of price and NAV returns remain statistically indistinguishable in both periods.

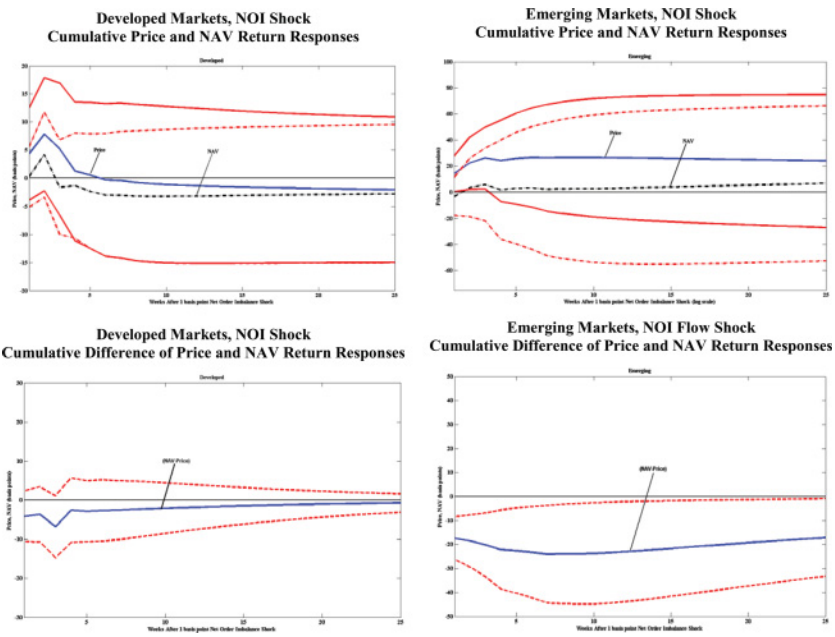

Figure 3
This figure shows the cumulative impulse responses of price and NAV return up to 25 weeks after an unexpected 1-basis point net order flow imbalance shock
These impulse responses are computed using coefficient estimates from the VECM estimated in Table 5 for developed and emerging country funds. The system is orthogonalized in the order: flow, NOI, NAV return, and price return. The top panels present the cumulative impulse responses of price and NAV return on the same figure, and the bottom panels present the difference of the two impulse responses. All figures include ± 2 standard deviation bounds, computed using the delete-cross-section jackknife method.

Table 5 reveals that for the emerging markets, the NOI forecasts the price return. The magnitude of the coefficient indicates that the forecasting power of the NOI is similar to that of cross-border flows (recall that the standard deviations of cross-border flows and the NOI are normalized to be the same, country-by-country). Is the forecasting power of the NOI for the price return generated by information or price pressure? We conduct the same analysis for the NOI as for the cross-border flows. Figure 3 shows the OIRFs of the NAV and price to a NOI shock. For developing country funds, the pictures are quite similar to the cross-border flow OIRFs. However, for emerging country funds, the behavior of the OIRFs offers a startling contrast to Figure 1. The cumulative price return response peaks at 26 basis points, eventually reverting to a level of 18 basis points in the long horizon. The cumulative NAV return, however, fluctuates around a level of 5 basis points for around 20 weeks before eventually rising up to meet the price level at a long-run level of 17 basis points, resulting in a zero discount after 100 weeks or so (not shown in the figure). The fact that the permanent level of both price and NAV cumulative returns is 17 basis

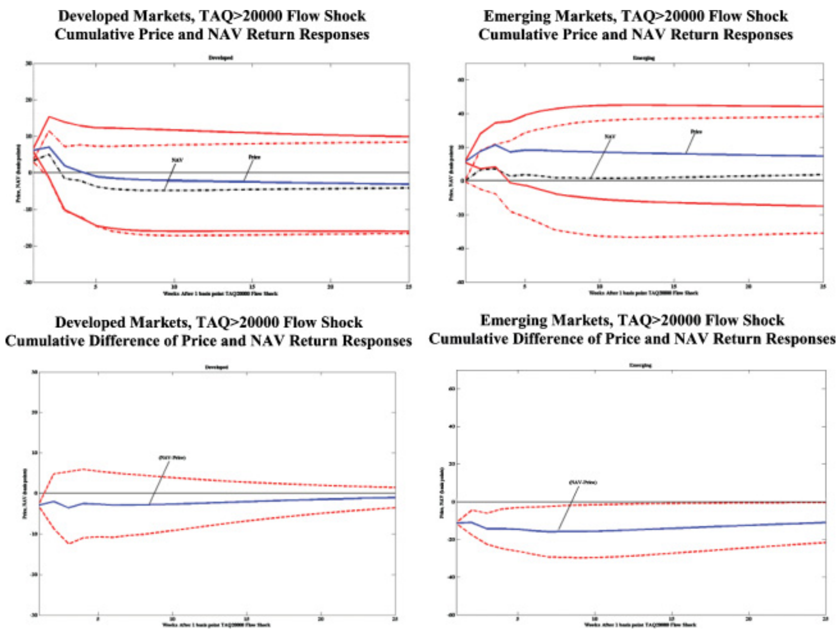

Figure 4
This figure shows the cumulative impulse responses of price and NAV returns up to 25 weeks after an unexpected 1-basis point TAQ > \$20,000 flow shock
These impulse responses are computed using coefficient estimates from the VECM systems estimated in Tables 6 and 7 for developed and emerging country funds. The system is orthogonalized in the order: flow, NOI, NAV return, price return. The top panels present the cumulative impulse responses of price and NAV return on the same figure, and the bottom panels present the difference of the two impulse responses. All figures include ±2 standard deviation bounds, computed using the delete-cross-section jackknife method.

points does suggest that there is information transmitted by the NOI, which is eventually incorporated after the short-run price pressure effects die out.

The second panel in Figure 3 shows that for emerging country funds, the difference of the two OIRFs is significantly negative for up to 25 weeks following the NOI shock. This provides strong support for the hypothesis that there is short-run price pressure in the NOI of closed-end funds. The result also helps to assuage concerns about the statistical power of our tests to detect price pressure, i.e., a non-zero difference of the OIRFs.

Tables 6 and 7 estimate the VECM in Table 5, but substitute large and small trade flows for the NOI. For both developed and emerging markets, the substitution leaves the coefficient estimates on the cross-border flow virtually unchanged. In Table 7, large trade TAQ flows positively forecast both the NAV return and the price return in emerging country funds, with virtually identical coefficients. We re-estimate the OIRFs of price and NAV, in response to a shock to the large trade TAQ flows. Figure 3 reveals that there is statistically significant evidence of short-run price pressure in the large trade TAQ flows, just as for the NOI flow measure.

Table 6
Vector error correction model with large and small trade TAQ flows—developed

	F_{it}	$T20000_{it}$	$T5000_{it}$	r^N_{it}	r^P_{it}
$N_{it-1} - P_{it-1}$	0.3485	0.8956	−3.7359	−0.0269	0.0752
	0.6013	0.6106	0.9398	0.0120	0.0189
F_{it-1}	0.2345	−0.0241	−0.0290	0.0005	0.0005
	0.0449	0.0263	0.0233	0.0004	0.0003
F_{it-2}	0.0615	0.0502	0.0391	0.0000	0.0000
	0.0459	0.0290	0.0300	0.0004	0.0005
F_{it-3}	0.0979	0.0152	0.0096	−0.0001	0.0002
	0.0393	0.0163	0.0158	0.0002	0.0002
$T20000_{it-1}$	−0.0283	0.1349	0.0444	0.0000	−0.0001
	0.0283	0.0240	0.0240	0.0003	0.0004
$T20000_{it-2}$	0.0287	0.1655	0.0183	−0.0006	−0.0006
	0.0302	0.0393	0.0511	0.0003	0.0004
$T20000_{it-3}$	−0.0197	0.0139	−0.0151	−0.0001	−0.0002
	0.0255	0.0368	0.0289	0.0003	0.0003
$T5000_{it-1}$	0.0458	0.0154	0.2036	0.0005	0.0008
	0.0243	0.0145	0.0317	0.0003	0.0003
$T5000_{it-2}$	0.0069	0.0221	0.1786	−0.0004	0.0000
	0.0265	0.0196	0.0257	0.0003	0.0004
$T5000_{it-3}$	0.0331	0.0371	0.1196	0.0001	0.0003
	0.0263	0.0213	0.0413	0.0003	0.0003
r^N_{it-1}	6.8222	−0.4306	−1.0461	−0.1330	0.1498
	1.6159	2.2586	2.1133	0.0362	0.0553
r^N_{it-2}	3.6251	−0.0879	0.6081	0.0443	0.1459
	2.0095	1.6145	1.4122	0.0355	0.0600
r^N_{it-3}	−4.1954	−3.0623	0.3864	0.0562	0.0849
	1.6271	1.8606	2.1338	0.0396	0.0393
r^P_{it-1}	0.3193	0.0594	−4.6405	0.0469	−0.1640
	1.7555	1.6787	1.9131	0.0283	0.0515
r^P_{it-2}	−0.3182	0.8478	−2.1365	0.0150	−0.0447
	1.1939	1.3793	1.4192	0.0248	0.0382
r^P_{it-3}	3.7496	1.4457	−3.4422	−0.0222	−0.0871
	1.2542	1.6963	2.1763	0.0250	0.0390
Adjusted R-squared	0.1130	0.0605	0.1756	0.1396	0.2007
N	2260	2260	2260	2260	2260

This table presents results from the estimation of the following system of equations for developed country funds:

$$\begin{bmatrix} F_{it} \\ T20000_{it} \\ T5000_{it} \\ r^N_{it} \\ r^P_{it} \end{bmatrix} = \begin{bmatrix} \alpha_F \\ \alpha_{T2} \\ \alpha_{T5} \\ \alpha_N \\ \alpha_P \end{bmatrix} + \begin{bmatrix} \delta_F \\ \delta_{T2} \\ \delta_{T5} \\ \delta_N \\ \delta_P \end{bmatrix} D_{it-1} + \begin{bmatrix} \varphi^F(L) & . & . & . & \varphi^P(L) \\ . & . & . & . & . \\ . & . & . & . & . \\ . & . & . & . & . \\ \pi^F(L) & . & . & . & \pi^P(L) \end{bmatrix} \cdot \begin{bmatrix} F_{it-1} \\ T20000_{it-1} \\ T5000_{it-1} \\ r^N_{it-1} \\ r^P_{it-1} \end{bmatrix}$$
$$+ \begin{bmatrix} \chi^F \\ \chi^{T2} \\ \chi^{T5} \\ \chi^N \\ \chi^P \end{bmatrix} X_t + \begin{bmatrix} \varepsilon^F_{it} \\ \varepsilon^{T2}_{it} \\ \varepsilon^{T5}_{it} \\ \varepsilon^N_{it} \\ \varepsilon^P_{it} \end{bmatrix}.$$

All data cover the period from August 12, 1994, to December 31, 1998. r^N_{it} is the NAV return, r^P_{it} is the price return in New York, D_{it-1} is the difference between log NAV and log price (the closed-end fund discount), F_{it} is the SSC cross-border flow into the country in which the fund specializes, in basis points of country index market capitalization, $T20000_{it}$ is the aggregate of orders that are greater than \$20,000 in size in the closed-end fund in New York, in basis points of fund market capitalization, $T5000_{it}$ is the aggregate of orders that are less than \$5,000 in size in the closed-end fund in New York, in basis points of fund market capitalization, and X_t represents exogenous regressors (contemporaneous and three lags of the S&P500 index return: we do not report these coefficients). We employ $P = 3$ weekly lags. Estimation is by pooled OLS equation-by-equation. Coefficients are restricted to be the same across all members of each group, but idiosyncratic intercepts are permitted. Standard errors are computed using the Rogers (1983) method, and are robust to cross-contemporaneous correlation, heteroskedasticity, and autocorrelation. Coefficients significant at the 10% level are in bold.

Table 7
Vector error correction model with large and small trade TAQ flows—emerging

	F_{it}	$T20000_{it}$	$T5000_{it}$	r_{it}^N	r_{it}^P
$N_{it-1} - P_{it-1}$	−0.5887	0.1725	−0.5785	−0.0120	0.0215
	0.2215	0.1566	0.1675	0.0078	0.0077
F_{it-1}	0.1349	0.0113	−0.0171	0.0015	0.0008
	0.0383	0.0169	0.0126	0.0006	0.0006
F_{it-2}	0.1284	0.0040	−0.0151	0.0009	0.0011
	0.0382	0.0152	0.0140	0.0003	0.0005
F_{it-3}	0.0706	−0.0062	−0.0196	−0.0011	−0.0005
	0.0217	0.0200	0.0137	0.0005	0.0007
$T20000_{it-1}$	0.0451	0.1792	0.0095	0.0007	0.0007
	0.0236	0.0272	0.0144	0.0004	0.0004
$T20000_{it-2}$	0.0039	0.1289	−0.0435	−0.0004	0.0001
	0.0199	0.0291	0.0120	0.0004	0.0005
$T20000_{it-3}$	0.0316	0.1187	−0.0160	−0.0008	−0.0007
	0.0195	0.0244	0.0128	0.0004	0.0004
$T5000_{it-1}$	0.0631	0.1171	0.3262	−0.0004	0.0006
	0.0366	0.0342	0.0454	0.0008	0.0007
$T5000_{it-2}$	−0.0250	−0.0645	0.2204	0.0007	0.0007
	0.0454	0.0247	0.0331	0.0004	0.0004
$T5000_{it-3}$	−0.0111	0.0172	0.2051	0.0002	0.0004
	0.0243	0.0181	0.0360	0.0006	0.0009
r_{it-1}^N	1.2197	−3.2874	−1.4443	−0.0528	0.1384
	1.6141	1.2509	1.1230	0.0184	0.0412
r_{it-2}^N	−0.7667	−1.0174	−1.4623	0.0601	0.0730
	1.6801	0.9279	1.1563	0.0265	0.0414
r_{it-3}^N	−1.6746	−1.6807	−2.1494	0.0560	0.0199
	1.2449	0.8048	0.7630	0.0317	0.0237
r_{it-1}^P	2.3265	0.7679	−1.2326	0.0151	−0.1973
	1.1762	0.8375	1.2122	0.0462	0.0389
r_{it-2}^P	1.6963	0.0351	−0.9324	0.0770	−0.0061
	1.2610	0.8099	0.9633	0.0333	0.0393
r_{it-3}^P	1.9762	1.0780	−0.2899	0.0414	−0.0111
	1.2107	0.7000	0.4732	0.0296	0.0258
Adjusted R-squared	0.1020	0.1189	0.4109	0.0960	0.1304
N	6542	6542	6542	6542	6542

This table presents results from the estimation of the following system of equations for emerging country funds:

$$\begin{bmatrix} F_{it} \\ T20000_{it} \\ T5000_{it} \\ r_{it}^N \\ r_{it}^P \end{bmatrix} = \begin{bmatrix} \alpha_F \\ \alpha_{T2} \\ \alpha_{T5} \\ \alpha_N \\ \alpha_P \end{bmatrix} + \begin{bmatrix} \delta_F \\ \delta_{T2} \\ \delta_{T5} \\ \delta_N \\ \delta_P \end{bmatrix} D_{it-1} + \begin{bmatrix} \varphi^F(L) & . & . & . & \varphi^P(L) \\ . & . & . & . & . \\ . & . & . & . & . \\ . & . & . & . & . \\ \pi^F(L) & . & . & . & \pi^P(L) \end{bmatrix} \cdot \begin{bmatrix} F_{it-1} \\ T20000_{it-1} \\ T5000_{it-1} \\ r_{it-1}^N \\ r_{it-1}^P \end{bmatrix}$$
$$+ \begin{bmatrix} \chi^F \\ \chi^{T2} \\ \chi^{T5} \\ \chi^N \\ \chi^P \end{bmatrix} X_t + \begin{bmatrix} \varepsilon_{it}^F \\ \varepsilon_{it}^{T2} \\ \varepsilon_{it}^{T5} \\ \varepsilon_{it}^N \\ \varepsilon_{it}^P \end{bmatrix}.$$

All data cover the period from August 12, 1994, to December 31, 1998. r_{it}^N is the NAV return, r_{it}^P is the price return in New York, D_{it-1} is the difference between log NAV and log price (the closed-end fund discount), F_{it} is the SSC cross-border flow into the country in which the fund specializes, in basis points of country index market capitalization, $T20000_{it}$ is the aggregate of orders that are greater than U.S. \$20,000 in size in the closed-end fund in New York, in basis points of fund market capitalization, $T5000_{it}$ is the aggregate of orders that are less than U.S. \$5,000 in size in the closed-end fund in New York, in basis points of fund market capitalization, and X_t represents exogenous regressors (contemporaneous and three lags of the S&P500 index return: we do not report these coefficients). We employ $P = 3$ weekly lags. Estimation is by pooled OLS equation-by-equation. Coefficients are restricted to be the same across all members of each group, but idiosyncratic intercepts are permitted. Standard errors are computed using the Rogers (1983) method, and are robust to cross-contemporaneous correlation, heteroskedasticity, and autocorrelation. Coefficients significant at the 10% level are in bold.

Taken together, our findings indicate that the predictability of returns by cross-border flows appears to be driven by information, while the TAQ flow measures show evidence of short-run price pressure. Our results were generated using the orthogonalization: cross-border flow; NOI; NAV return; price return. Changing the order of the NOI and the cross-border flow and computing the impulse response functions under the orthogonalization (NOI; cross-border flow; NAV return; price return) does not materially affect our findings. Essentially, the contemporaneous correlation between NOI and cross-border flow *innovations* is not extremely high in our data. The same is true for our findings in Tables 6 and 7, in which we substitute small and large trade TAQ flows for the NOI.

The next section investigates trend-following and trend-reversing by cross-border flows and NOI in response to different types of return shocks.

3.4 Trend-following and trend-reversing

Figure 5 shows the impulse responses of cross-border flows to absolute and relative return shocks. In our setup, an absolute return shock is a symmetric 500-basis point shock to both NAV and price, and a relative return shock is specified as a 500-basis point shock to the NAV, holding price constant.

The top panel of Figure 5 reveals that cross-border flows increase in response to a shock to absolute returns, for both developed and emerging markets. For developed (emerging) markets, the movement is positive and statistically significant for 25 (three) weeks following the shock. The bottom panel of Figure 5 shows that in response to a relative return shock, however, developed and emerging market cross-border flows behave differently. Flows into developed markets continue to trend-follow, although this response is only statistically significant for the first 4 weeks following the shock. In contrast, cross-border flows into emerging markets display a trend-reversing response. The response is statistically significant and negative 20 weeks after the shock, and is large in magnitude. After 25 weeks, the point estimate is a little lower than -0.75 basis points of country market capitalization.

The finding that cross-border flows into emerging markets show trend-reversing rather than trend-following behavior stands in contrast to that reported by Froot, O'Connell, and Seasholes (2001). The critical difference is that the latter paper measured the response of flows only to past absolute returns, whereas this paper also investigates the response of flows to relative returns. Given the size and significance of the trend-reversing effect, it is clear that the distinction between absolute and relative returns has an important impact on the measurement of trend-following in emerging markets.

One interpretation of this result is that cross-border institutional flows are linked to rationally computed expected returns. This interpretation arises from our definitions of absolute and relative returns. We link absolute returns with movements in fundamentals (NAV and price represent claims to the same set of cash flows) and relative returns with nonfundamental sources. This

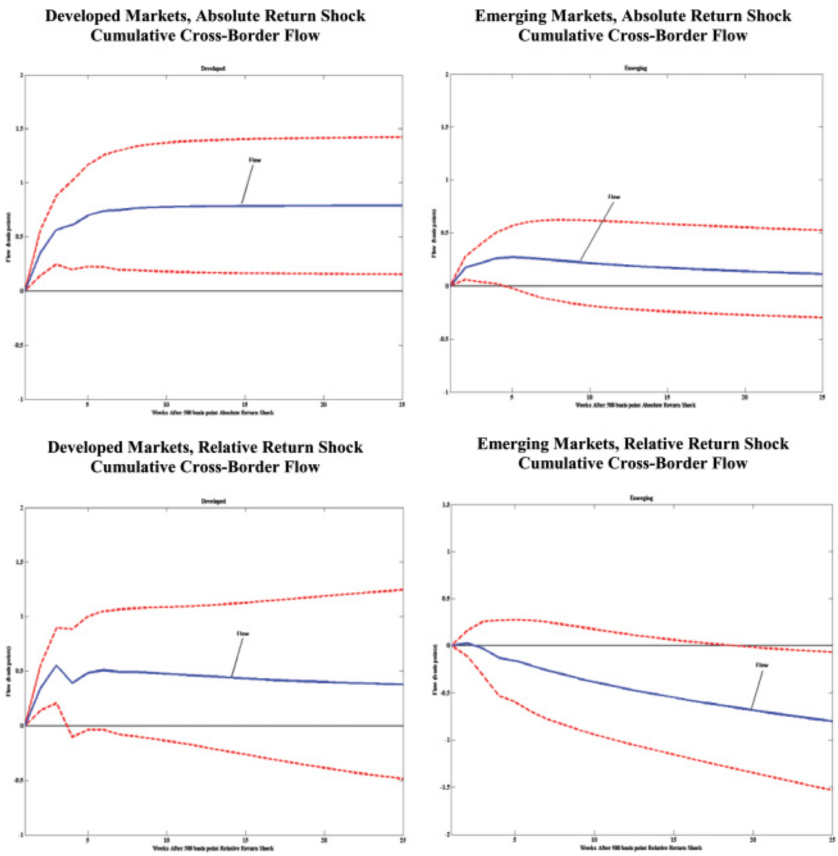

Figure 5
The top panel shows the cumulative impulse responses of developed and emerging cross-border flows up to 25 weeks after an unexpected 500-basis point shock to closed-end fund NAV, holding closed-end fund price constant
These impulse responses are computed using coefficient estimates from the VECM systems estimated in Tables 6 and 7 for developed and emerging country funds. The bottom panel shows the impulse responses of developed and emerging cross-border flows to a symmetric 500-basis point shock to both closed-end fund NAV, and closed-end fund price. The red dashed lines indicate ± 2 standard deviation bounds, computed using the delete-cross-section jackknife method.

interpretation renders our results similar to those in Cohen, Gompers, and Vuolteenaho (2002), and Froot and Ramadorai (2005). Cohen et al. analyze quarterly U.S. equity purchases by institutional investors subsequent to permanent return shocks (“cash-flow news”) and transitory return shocks (“expected return news”), constructed using a VAR and the Campbell-Shiller (1988) decomposition. They find trend-following subsequent to return shocks generated by revisions in cash-flow expectations, and trend-reversing effects subsequent to (temporary) revisions in discount factors. Froot and Ramadorai (2005), using data on institutional investors’ trades in currencies, find comparable results,

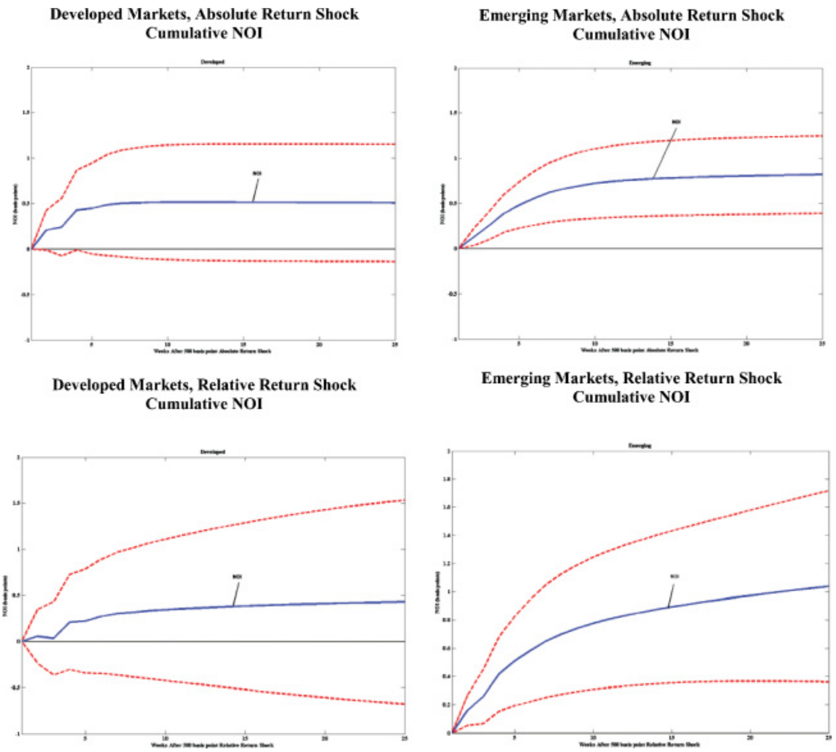

Figure 6
The top panel shows the cumulative impulse responses of developed and emerging net order flow imbalances up to 25 weeks after an unexpected 500-basis point shock to closed-end fund NAV, holding closed-end fund price constant
These impulse responses are computed using coefficient estimates from the VECM systems estimated in Tables 6 and 7 for developed and emerging country funds. The bottom panel shows the impulse responses of developed and emerging net order flow imbalance to a symmetric 500-basis point shock to both closed-end fund NAV, and closed-end fund price. The dashed lines indicate ±2 standard deviation bounds, computed using the delete-cross-section jackknife method.

using a similar VAR and decomposition. Another possibility is that cross-border investors are "value-chasing", i.e., when NAV increases relative to closed-end fund price, the institutional investors in our data shift their demand to closed-end fund shares (rather than purchasing the shares abroad).[18]

Turning to the behavior of the NOI, Figure 6 shows that unlike cross-border flows, the NOI does not distinguish between absolute and relative return shocks in either developed or emerging markets. The NOI response to both types of shocks is virtually the same. This suggests that closed-end fund flows are not linked to rationally computed expected returns.

[18] We thank an anonymous referee for this interpretation.

3.5 Related findings from VECM estimation

There are several other features of interest in Tables 5, 6, and 7. First, both sets of flows are highly persistent–the coefficients of lagged cross-border flows in the cross-border flow equation, and lagged NOI in the NOI equation are statistically significant and positive in both developed and emerging country fund panels. The finding that cross-border flows are highly persistent echoes that in Froot, O'Connell, and Seasholes (2001). Institutional portfolio flows appear to have weekly own autocorrelation coefficients of between 0.14 and 0.24, and to have important higher-order positive partial autocorrelations as well.

Second, there is significant evidence that the two types of flows are correlated with and forecast one another—the coefficient on lagged cross-border flow in the NOI equation is positive in the developed country-fund panel, and the coefficient on the first lag of NOI in the cross-border flow equation is positive in the emerging country-fund panel. Furthermore, both large and small trade TAQ flows forecast cross-border flows in Table 7. These results suggest that our flow measures are useful controls for correlated demand across markets.

Third, both NAV and price returns are strongly related to the level of the discount in prior weeks—future NAV returns are negatively related to the level of the lagged discount, and future price returns are positively related to the level of the lagged discount. The magnitudes of the coefficients in the price equation are in general higher than those in the NAV equation. It appears that much of the transitory deviation in closed-end fund discounts comes from reversion in price, rather than NAV. This is similar to the findings of Hardouvelis, LaPorta, and Wizman (1994), and Frankel and Schmukler (2000).

4. Conclusion

This paper sheds light on the relationship between cross-border equity flows and domestic and foreign market equity returns. We have four main findings: first, lagged weekly cross-border equity flows forecast emerging market equity returns over and above the contemporaneous relationship between flows and returns. The much-noted forecasting power of cross-border flows for emerging market equity returns, therefore, is not merely a by-product of the persistence of flows and the contemporaneous relationship between flows and returns. Second, cross-border equity flows forecast both the NAV and price returns of emerging market closed-end funds, and the forecasts are roughly of the same magnitude. Third, cross-border equity flows into emerging markets are trend-following in response to absolute return shocks (symmetric movements in NAV and price returns), and trend-reversing in response to relative return shocks (asymmetric movements in NAV and price returns). Finally, flows into closed-end funds forecast price returns, but not NAV returns in the short run. Taken together, the findings suggest that information, rather than price pressure is responsible for the observed predictability of domestic equity returns by cross-border flows.

The results also contribute to a better understanding of the factors that drive country closed-end fund discounts.

Appendix. Constructing closed-end fund flows from TAQ

The Transactions and Quotes (TAQ) database of the NYSE does not classify transactions as buys or sells. To classify the direction of each trade, we use a method suggested by Lee and Ready (1991). The method works by matching trades to pre-existing quotes, based on time stamps.[19] If the trade price lies between the quote midpoint and the upper (lower) quote, the trade is classified as buyer-initiated (seller-initiated). If the trade price lies at the midpoint of the quotes, we use a tick test, which classifies trades that occur on an uptick as buys, and those on a downtick as sells. If the trade price lies at the midpoint of the quotes and the transaction price has not moved since the previous trade (trade occurs on a "zero-tick"), Lee and Ready suggest classifying the trade based on the last recorded move in the transactions price. If the last recorded trade was classified as a buy (sell), then the zero-tick trade is classified as a buy (sell).

The analysis in Lee and Radhakrishna (2000) evaluates the algorithm's effectiveness, using a sample of buy-sell classified trades obtained from the NYSE. They find the algorithm to be 93% effective. In particular, its accuracy is highest (at 98%) when trade-to-quote matching (rather than trade-to-trade matching) can be accomplished, lower (at 76%) for those trades that have to be classified using a tick test, and lowest (at 60%) for those trades classified using a zero-tick test. We eliminate this last source of variability in our data by deleting those trades for which a zero-tick test is required. Use of this trade-to-quote matching algorithm allows us to classify the majority (e.g., 87% in the case of the Argentina Fund) of the total trades into buys or sells. We eliminate trades occurring at the opening auction as these are impossible to classify effectively. We also eliminate trades that are canceled, and those that are batched or split up in execution.

After classifying trades on the basis of direction, we aggregate classified buyer- and seller-initiated transactions and subtract the sells from the buys each day to yield the net order imbalance measure. We also separately aggregate all buy and sell trades below $5,000 in size, and above $20,000 in size each day, and net them out to yield the small and large trade TAQ flow measures. Finally, we normalize these flow measures by daily shares outstanding, and aggregate them up to the weekly frequency.

Table A.1 reports the results from an exercise to benchmark the TAQ flow measures we create against changes in an institutional ownership reported in the mandatory 13-F filings of institutional investors. As these filings are quarterly, we aggregate our flow measures up to the same frequency to make them comparable. The first column shows that TAQ flows from trades greater than $20,000 have a correlation ranging between −36% and 57% at the quarterly frequency with the 13-F ownership changes. In many cases, the correlation is negative, suggesting that the initiated orders came from individuals rather than institutions. The second column reveals that flows from small trades less than $5,000 in size have a lower correlation with changes in institutional ownership, suggesting that these small trades are even more likely to be initiated by individuals. These correlations suggest that trading in closed-end funds is primarily associated with individual investors (see Lee, Shleifer, and Thaler, 1991). The third column shows that the correlation of the net order imbalance with changes in institutional ownership almost always lies between that of large and small trades, suggesting that this measure is a summary of initiated demand from either individuals or institutions.

[19] Lee and Ready (1991) suggest lagging quotes by 5 seconds to avoid problems of stale reporting of trades.

Table A.1
Institutional ownership and order flow in closed-end funds

	ρ(T20, dS)	ρ(T5, dS)	ρ(NOI, dS)
Developed markets			
First Australia Fund	0.051	0.134	0.056
Austria Fund		0.154	0.154
Germany Fund		−0.141	−0.141
New Germany Fund	0.249	0.323	0.272
Irish Investment Fund	−0.296	−0.351	−0.343
Italy Fund	0.387	0.026	0.372
Japan Equity Fund	−0.048	−0.051	−0.051
Japan OTC Equity Fund	0.128	−0.212	0.102
Spain Fund	0.388	0.255	0.409
Swiss Helvetia Fund	0.147	−0.001	0.141
Average correlation	0.126	0.014	0.097
Emerging markets			
Argentina Fund	−0.144	−0.169	−0.153
Brazil Fund	−0.171	−0.339	−0.187
Brazilian Equity Fund	0.113	−0.032	0.111
Chile Fund		0.077	0.077
India Fund	−0.100	−0.100	−0.105
India Growth Fund	0.005	−0.014	0.000
Jardine Fleming India Fund	−0.362	0.049	−0.341
Morgan Stanley India Investment Fund	0.052	−0.374	−0.099
Indonesia Fund	−0.250	−0.363	−0.277
Jakarta Growth Fund	−0.026	−0.100	−0.045
First Israel Fund	−0.149	−0.323	−0.171
Fidelity Advisor Korea Fund	0.022	−0.028	0.009
Korea Equity Fund	−0.208	−0.154	−0.220
Korea Fund		0.096	0.096
Korean Investment Fund	−0.041	−0.009	−0.027
Malaysia Fund	−0.124	−0.166	−0.136
Mexico Equity & Income Fund	0.439	0.361	0.440
Mexico Fund	0.573	−0.029	0.560
Pakistan Investment Fund	−0.530	0.107	−0.494
First Philippine Fund	−0.178	−0.217	−0.211
Portugal Fund	0.102	0.171	0.133
Singapore Fund	0.186	−0.142	0.162
Southern Africa Fund	−0.320	−0.046	−0.279
ROC Taiwan Fund	−0.343	0.011	−0.328
Taiwan Equity Fund	0.097	−0.155	0.083
Taiwan Fund	0.158	−0.078	0.123
Thai Capital Fund	−0.137	−0.165	−0.143
Thai Fund	−0.117	0.080	−0.075
Turkish Investment Fund	0.134	−0.078	0.121
Average correlation	−0.049	−0.073	−0.047

This table presents correlations between quarterly aggregated categorized signed order flow (net buys less net sells) from the TAQ database and the net change in institutional ownership reported in quarterly 13-F filings data from the Spectrum database (dS). All variables are normalized by the market capitalization of the fund as reported in CRSP. The columns report the correlations between dS and TAQ flows from trades greater than \$20,000 in size (T20); TAQ flows from trades less than \$5,000 in size (T5), and net order flow imbalance (NOI) (all classified buys less all classified sells). Rows labeled "Average correlation" report the average correlation coefficient across funds in each of the developed and emerging market groups. Blank entries mean that no classifiable trades of that size were reported in the TAQ database over the time period.

Table A.2
Characteristics of U.S. closed-end fund investors in 1998

	All U.S. households	Households owning mutual funds	Households owning closed-end funds
Median			
Household income	\$35,000	\$55,000	\$56,000
Household financial assets	\$50,000	\$80,000	\$250,000
Proportion			
Household primary or co-decision maker for investing:			
Four-year college degree or more	0.36	0.50	0.48
Completed graduate school	0.12	0.18	0.30

This table reproduces data from the May 1998 Investment Company Institute *Annual Mutual Fund Tracking Survey* and the 1998 Investment Company Institute *Profile of Mutual Fund Shareholders*. The institute surveyed 3,000 respondents using a weighted sample to match the age distribution of the population. From the Profile, the proportion of all U.S. households that own any mutual fund is 44%, while the proportion of all U.S. households that own closed-end funds is 2.3%. For the three categories of shareholders represented in columns (all households, households that own mutual funds and households that own closed-end funds), we report the median household income, the median household financial assets (excluding the primary residence, but including assets in employer-sponsored retirement plans), and the proportion of households in which the primary or co-decision maker for investing holds a college degree or a graduate degree. For example, in 48% of households that own closed-end funds, the household primary or co-decision maker for investing has a 4-year college degree.

References

Balvers, R., Y. Wu, and E. Gilliland. 2000. Mean Reversion Across National Stock Markets and Parametric Contrarian Investment Strategies. *Journal of Finance* 55:745–72.

Barberis, N., and A. Shleifer. 2003. Style Investing. *Journal of Financial Economics* 68(2):161–99.

Bekaert, G. K., C. R. Harvey, and R. L. Lumsdaine. 2002. The Dynamics of Emerging Market Equity Flows. *Journal of International Money and Finance* 21:295–350.

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

Bohn, H., and L. L. Tesar. 1996. U.S. Equity Investment in Foreign Markets: Portfolio Rebalancing or Return Chasing? *American Economic Review Papers and Proceedings* 86:77–81.

Bonser-Neal, C., G. Brauer, R. Neal, and S. Wheatley. 1990. International Investment Restrictions and Closed-End Country Fund Prices. *Journal of Finance* 45:523–47.

Brennan, M. J., and H. H. Cao. 1997. International Portfolio Investment Flows. *Journal of Finance* 52:1851–80.

Campbell, J. Y. 1991. A Variance Decomposition for Stock Returns. *Economic Journal* 101:157–79.

Campbell, J. Y., S. J. Grossman, and J. Wang. 1993. Trading Volume and Serial Correlation in Stock Returns. *Quarterly Journal of Economics* 108:905–39.

Campbell, J. Y., T. Ramadorai, and A. Schwartz. 2007. Caught on Tape: Institutional Trading, Stock Returns and Earnings Announcements. Unpublished Working Paper, Harvard University.

Campbell J. Y., and R. Shiller. 1988. The Dividend Price Ratio and Expectations of Future Dividends and Discount Factors. *Review of Financial Studies* 1:195–227.

Campbell, J. Y., and S. Thompson. 2005. Predicting the Equity Premium Out of Sample: Can Anything Beat the Historical Average? NBER Working Paper 11468.

Choe, H., B-C. Kho, and R. M. Stulz. 1999. Do Foreign Investors Destabilize Stock Markets? The Korean Experience in 1997. *Journal of Financial Economics* 54:227–64.

Choe, H., B-C. Kho, and R. M. Stulz. 2001. Do Domestic Investors Have More Valuable Information About Individual Stocks Than Foreign Investors? NBER Working Paper 8073.

Chopra, N., C. M. C. Lee, A. Shleifer, and R. Thaler. 1993. Yes, Discounts on Closed-End Funds Are a Sentiment Index. *Journal of Finance* 48:801–8.

Chordia, T., R. Roll, and A. Subrahmanyam. 2002. Order Imbalance, Liquidity, and Market Returns. *Journal of Financial Economics* 65:111–30.

Chordia, T., and A. Subrahmanyam. 2004. Order Imbalance and Individual Stock Returns: Theory and Evidence. *Journal of Financial Economics* 72:485–518.

Cohen, R., P. Gompers, and T. O. Vuolteenaho. 2002. Who Underreacts to Cash?ow News? Evidence from Trading Between Individuals and Institutions. *Journal of Financial Economics* 66:409–62.

Clark, J., and E. Berko. 1997. "Foreign Investment Fluctuations and Emerging Market Stock Returns: The Case of Mexico" (May 1997). FRB of New York Staff Report No. 24.

DeLong, J. B., A. Shleifer, L. H. Summers, and R. J. Waldmann. 1990. Noise Trader Risk in Financial Markets. *Journal of Political Economy* 98:703–38.

Dvorak, T. 2005. Do Domestic Investors Have an Information Advantage? Evidence from Indonesia. *Journal of Finance* 60:817–89.

Edison, H., and F. Warnock. 2003. Cross-Border Listing, Capital Controls, and Equity Flows to Emerging Markets. Board of Governors of the Federal Reserve System International Finance Discussion Paper 770.

Engle, R. F., and C. W. J. Granger. 1987. Co-integration and Error-Correction: Representation, Estimation and Testing. *Econometrica* 55:251–76.

Ferson, W. E., and C. R. Harvey. 1991. The Variation of Economic Risk Premiums. *Journal of Political Economy* 99:385–415.

Frankel, J. A., and K. A. Froot. 1987. Using Survey Data to Test Standard Propositions Regarding Exchange Rate Expectations. *American Economic Review* 77:133–53.

Frankel, J. A., and S. L. Schmukler. 1996. Country Fund Discounts and the Mexican Crisis of 1994: Did Mexican Residents Turn Pessimistic Before International Investors? *Open Economies Review* 7:511–34.

Frankel, J. A., and S. L. Schmukler. 2000. Country Funds and Asymmetric Information. *International Journal of Finance and Economics* 5:177–95.

Froot, K. A., and E. Dabora. 1999. How Are Stock Prices Affected by the Location of Trade? *Journal of Financial Economics* 53:182–216.

Froot, K. A., P. G. J. O'Connell, and M. S. Seasholes. 2001. The Portfolio Flows of International Investors. *Journal of Financial Economics* 59:151–93.

Froot, K. A., and T. Ramadorai. 2005. Currency Returns, Intrinsic Value and Institutional Investor Flows. *Journal of Finance* 60:1535–66.

Gemmill, G., and D. C. Thomas. 2002. Noise-Trading, Costly Arbitrage, and Asset Prices: Evidence from Closed-End Funds. *Journal of Finance* 57:2571–94.

Goetzmann, W. N., M. Massa, and K. G. Rouwenhorst. 1999. Behavioral Factors in Mutual Fund Flows. Yale ICF Working Paper 00-14.

Goyal, A., and I. Welch. 2007. A Comprehensive Look at the Empirical Performance of Equity Premium Prediction. Yale ICF Working Paper No. 07-11, 2007.

Griffin, J. M., F. Nardari, and R. M. Stulz. 2004. Daily Cross-Border Equity Flows, Pushed or Pulled? *Review of Economics and Statistics* 86:641–57.

Grinblatt, M., and M. Keloharju. 2001. What Makes Investors Trade? *Journal of Finance* 56:589–616.

Hamilton, James D. 1994. *Time Series Analysis*. Princeton University Press.

Hardouvelis, G., R. LaPorta, and T. Wizman. 1994. What Moves the Discount on Country Equity Funds? in Jeff Frankel (ed.), *The Internationalization of Equity Markets*, Chicago, IL: University of Chicago Press.

Hasbrouck, J. 1991. Measuring the Information Content of Stock Trades. *Journal of Finance* 46:179–207.

Henry, P. B. 2000. Stock Market Liberalization, Economic Reform and Emerging Market Equity Prices. *Journal of Finance* 55:529–64.

Hong, H., and J. C. Stein. 2003. Differences of Opinion, Short-Sales Constraints and Market Crashes. *Review of Financial Studies* 16:487–525.

Hvidkjaer, S. 2006. A Trade-Based Analysis of Momentum. *Review of Financial Studies* 19:457–91.

Investment Company Institute. 1998. *Annual Mutual Fund Tracking Survey*. Washington, D.C.

Investment Company Institute. 1998. *Survey of Closed-End Fund Owners*. Washington, D.C.

Investment Company Institute. 1999. *1998 Profile of Mutual Fund Shareholders*. Washington, D.C.

Kang, J-K., and R. M. Stulz. 1997. Why is there a Home Bias? An Analysis of Foreign Portfolio Equity Ownership in Japan. *Journal of Financial Economics* 46:2–18.

Lee, C. M. C., and B. Radhakrishna. 2000. Inferring Investor Behavior: Evidence from TORQ Data. *Journal of Financial Markets* 3:183–204.

Lee, C. M. C., and M. Ready. 1991. Inferring Trade Direction from Intraday Data. *Journal of Finance* 46: 733–46.

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

Newey, Whitney K., and Kenneth D. West. 1987. A Simple, Positive Semi-Definite, Heteroskedasticity and Autocorrelation Consistent Covariance Matrix. *Econometrica* 55(3):703–8.

O'Connell, P. G. J. 2005. Dealing With Transactions Costs. Unpublished Working Paper, State Street Associates.

Rogers, Everett M. 1983. *Diffusion of Innovations*. New York: The Free Press.

Seasholes, M. S. 2004. Re-examining Information Asymmetries in Emerging Stock Markets. Unpublished Working Paper, University of California, Berkeley, CA.

Shanthikumar, Devin M. 2004. Small and Large Trades Around Earnings Announcements: Does Trading Behavior Explain Post-Earnings-Announcement Drift? Working Paper.

Shao, Jun, and C. F. J. Wu. 1989. A General Theory for Jackknife Variance Estimation. *The Annals of Statistics* 17(3):1176–97.

Sias, R. W. 1997. Price Pressure and the Role of Institutional Investors in Closed-End Funds. *Journal of Financial Research* 20:211–29.

Stulz, R. M. 1999. International Portfolio Flows and Security Markets. in M. Feldstein (ed.), *International Capital Flows*, University of Chicago Press, Chicago, IL, 257–93.

Tesar, L., and I. M. Werner. 1994. International Equity Transactions and U.S. Portfolio Choice in J. A. Frankel (ed.), *The Internationalization of Equity Markets*, University of Chicago Press, Chicago, IL.

Tesar, L., and I. M. Werner. 1995. Home Bias and High Turnover. *Journal of International Money and Finance* 14:467–92.

Warther, V. 1995. Aggregate Mutual Fund Flows and Security Returns. *Journal of Financial Economics* 39: 209–35.