The Information Content of International Portfolio Flows

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Abstract

This paper attempts to attribute the forecasting power of international portfolio flows for local equity market returns to either better information about fundamentals or price pressure. Price pressure is a potential explanation of the observed forecasting power because flows have positive contemporaneous price impact effects and are strongly positively autocorrelated. We find evidence that observed forecasting power is due predominately to information and only slightly due to price pressure in the foreign market. We control for country fundamentals by using closed-end fund prices, as traded in New York. Interestingly, the flows into the closed-end funds themselves (rather than the cross-border flows into the underlying NAVs) seem to forecast more negative returns in closed-end fund prices than in country NAVs. So while there is no apparent information in closed-end fund flows, there is some evidence that price pressure is present in closed-end fund prices.

JEL Classifications: G15, F21, G11
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I. Introduction

A number of previous studies have found that international investor's transactions matter for local countries' equity prices. Tesar and Werner (1994, 1995) and Brennan and Cao (1997) found that over relatively low frequencies (e.g., quarterly or monthly) international prices tend to rise when international investors purchase – i.e., when domestics sell – local equities. Of course, such low frequency correlations are not enough to establish whether the correlated price changes lead or lag portfolio flows. Higher frequency data is needed to analyze the interaction between flows and returns. Such data have been used by Choe, Kho and Stulz (1999) and Froot, O'Connell and Seasholes (2001) in the international context. In domestic settings, Goetzmann, Massa and Rouwenhorst (1999) look at flow data in the U.S., and Grinblatt and Keloharju (2000) analyze flows in Finland. FOS employ data on international investor flows across a wide number of countries, and find evidence that suggests at least a portion of the price increase occurs subsequent to internationals' purchases. The portfolio flows of international investors predict domestic-market equity returns. However, the interpretation of this "anticipation effect" is unclear**.** Indeed, there are two very different interpretations, and these have different implications for the ultimate performance of these transactions.

Under the first interpretation, international investors are better informed about a country's prospects than the domestics with whom they trade. As a result, they are buyers before a widely perceived improvement in fundamentals takes place. Either they are forecasting a change in fundamentals, or they perceive a change in fundamentals before domestics. While readily understandable, this view is opposite to the prevailing wisdom that international investors stand at an informational disadvantage relative to domestics (see for example Brennan and Cao, 1997). A recent study by Seasholes (2000) provides evidence in support of this view using earnings announcements of local-market firms. He finds that international investors tend to be buyers (sellers) in advance of what turn out to be good (bad) earnings surprises. Indeed, Seasholes finds that profits seem to be strongest in large firms, and it is large firms that appear to be most highly concentrated in international portfolios (see Kang and Stulz (1997) for evidence pertaining to Japan). So international investors may have an informational advantage in the equities of the larger, more publicly recognized local firms.

The second interpretation of the anticipation effect is that follow-on returns are attributable to price pressure. International investors therefore have no special knowledge of country fundamentals. The story here is that investors' purchases are positively autocorrelated at high frequencies. Such positive autocorrelation arises naturally in models in which investors are informed, or think they are informed, and are able to hide their orders among liquidity or other random trades (e.g., Kyle, 1985). It also arises in models in which some group of investors displays positive feedback trading or a preference for winners (e.g., Frankel and Froot, 1987, DeLong, Summers, Shleifer, and Waldmann, 1990, Hong and Stein, 1999, and Barberis and Shleifer, 2000). In these models, the autocorrelation of investor trades generates predictability in prices, even if those trades are unrelated to fundamentals, and even if there are rational traders in the model. Thus, under the price pressure interpretation, current purchases by international investors forecast additional future international demand, but not an improvement in fundamentals. The implication is that the observed anticipation effect is relatively short-lived. Given the relatively long slow decay of portfolio flow autocorrelations, it appears that the longer-term price decay cannot be detected in the short time series samples that are currently available.

This paper proposes tests to distinguish these two interpretations in a data set that clearly generates anticipation effects. Whereas prior work has shown that daily cross-border flows predict returns of equity markets over treasury bills, in this paper we ask whether the same information predicts returns over and above a measure of value that is stripped of the price pressures potentially associated with the local market shares. We remove price pressure effects by comparing returns on the local market with the returns on the associated country's NYSE closed-end country fund. Given that we can control for the institutional flows into the closed-end funds themselves, we can detect the extent to which country inflows predict country returns *in excess* of closed-end fund returns.

Essentially, our argument is that under the price pressure hypothesis, a shock to the flows of international investors into local stock markets should, all else equal, *increase* the closed-end fund discount, i.e., the percentage by which local net asset values exceed the price of the fund traded on the NYSE. Since we are controlling for the price of the fund on the NYSE and the flows into the closed-end fund, prices in the underlying local equity market should be responsive to inflows under the price pressure hypothesis.

Alternatively, under the information interpretation, foreign investors have better information about the future value of the underlying stocks. In this case, a shock to net inflows into the local equity market should be associated with an increase in the value both of the local equities *and* the price of the closed-end fund. Note that this is a strong interpretation of the information hypothesis. Under it, flows do not move prices at all; they simply signal information about underlying value.

Of course, we do make several important assumptions in drawing such a sharp distinction based on the outcome of our tests. First, we assume that closed-end fund discounts strip out long run fundamentals that are common to both NAVs and prices. Our tests do allow closed-end fund prices to move as a result of fads or price pressure. However, we need to assume that we have controlled for any price components that are correlated with cross-border flows. We do this by conditioning on both retail and institutional flows into and out of the closed-end funds. To see this, suppose that we find cross-border flows forecast both NAVs and prices. We want to be sure that this *doesn't* occur because the flows are simply forecasting positive future sentiment that extends to both NAVs and prices. To eliminate this possibility, we condition our vector autoregressions on flows (either institutional or retail) into the closed-end fund.

To preview our results, we find that cross-border inflows into foreign countries do indeed forecast positively changes in both NAVs and prices. They do so to the same extent, so that cross-border flows have no discernable impact on closed-end fund discounts. This is broadly consistent with the information story. Of course, it could also be consistent with the price pressure story, if cross-border flows were correlated with shocks to future sentiment in prices. However, when we control for flows into the closed-end funds themselves, we find no diminution of the results. Indeed, flows into closed-end funds seem to be unrelated to cross-border flows and to future changes in NAVs and prices. Thus, the evidence points strongly in favor of the information hypothesis. The results provide little other explanation of the positive forecasts of closed-end prices generated by cross-border flows.

The rest of the paper is structured as follows. Section II describes the data. Section III lays out the econometric tests, and section IV presents the results. Section V concludes and summarizes our findings.

II. Data

a. Portfolio Flow Data

Our cross-border portfolio flow data come from State Street Bank and Trust. SSB is the largest U.S. master trust bank, the largest U.S. mutual fund custodian, with nearly 40% of the industry's funds under custody, and one of the world's largest global custodians. It has approximately $7 trillion of assets under custody. SSB records all transactions in these assets, including cash, underlying securities, and derivatives wherever they are held.

From this database, we distinguish cross-border equity transactions by observing the currency in which equity transactions are settled. For example, equity transactions that settle in Thai baht are defined to encompass purchases and sales of Thai equities. To produce our data, SSB has extracted all transactions in its universe of transactions that settle in baht, and removed from them any transactions initiated by Thai investors. Our measure of cross-border flows is therefore that of transactions by non-local SSB clients in local equity securities.

These flow data appear to be representative of *total* cross-border flows country by country, in that they are highly correlated with total foreign net equity inflows in those countries where such measures are available. However, for the purposes of this paper, we prefer to interpret the SSB flows as representing the demands of institutional investors, rather than as a proxy for total foreign demand for a country's shares. Institutions (pensions, mutual funds and endowments) comprise the vast majority of SSB custodial clients. For a more complete description of the properties of the data, see Froot, O'Connell, and Seasholes (2001).

The data allow us to identify cross-border flows for the 25 countries (of which 8 are developed countries, and 17 are emerging markets) for which we have weekly closed-end country fund data.[1] Our sample period is August 1, 1994 through December 24, 1998, the period during which the State Street data are available.

We use net flows into each country, 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 local market capitalization, $m_{i,t}$, so scaled flows are denoted by $F_{i,t} = f_{i,t} / m_{i,t}$. To measure equity-market capitalization, we use MSCI indexes for all countries (except Zimbabwe, for which we employ a broad market index). Daily currency prices against the U.S. dollar use WM/Reuters rates from Datastream.

b. Country Closed-End Fund Data

We have collected data on 39 closed-end country funds, encompassing 25 countries. The data come from CDA Wiesenberger's Closed-End Fund database. We selected only those funds that trade on the NYSE and/or AMEX. The database is not subject to survivorship bias, since it includes funds that did not survive. In any case, during our sample period, no fund related to our 25 countries failed or closed. (One fund, the Fidelity Advisor Korea Fund, began end-October, 1994, and data for that fund is available beginning November 4, 1994 – so there could be "birth bias" in this sample, if such a start is unusual.) Discounts for each fund are computed as the natural logarithm of the fund's net asset value (NAV) divided by its price,

[1] A complete list of the funds from Developed and Emerging markets is in the Appendix.

$D_{it} = \ln(N_{it} / P_{it})$. Since there are 39 funds, and 230 weeks during our sample period, this makes a total of 8957 fund-weeks (the Fidelity Advisor Korea Fund has a later start date than the other funds). Of these, we have 8955 fund-weeks of data and 2 missing observations from the CDA Wiesenberger database. These missing data points correspond to the ROC Taiwan Fund's NAV's for the last week in January 1998, and the first week in February 1998. The average discount over all fund weeks is 7.01%, and the standard deviation of the discount over fund weeks is 17.08.

c. TAQ Flows Data

In addition to the cross-border flows into the assets that comprise the funds' NAVs, we also control for institutional flows into the fund shares themselves. Since all of our funds are traded on the NYSE and AMEX, we can use the Transactions and Quotes (TAQ) database to construct a measure of institutional flows. The TAQ data is trade-by-trade data which records transactions prices and quantities, but does not classify a given transaction as either a "buy" or a "sell."

To classify the direction of flow, we use a matching algorithm suggested by Lee and Ready [1991]. This algorithm looks at the price relative to lagged quotes to determine whether a transaction is a buy or sell. The analysis in Lee and Radhakrishna [2000] evaluates the effectiveness of the Lee and Ready matching algorithm. They find that, after removing trades with potentially ambiguous classifications (such as trades that are batched or split up during execution), the buy/sell classification algorithm is 93% effective. In particular, they find that the accuracy is highest (at 98%) when trade-to-quote matching (rather 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. As an example, use of this trade-to-quote matching algorithm allows us to classify 87% of the total trades in the Argentina Fund into buys or sells.

After classifying trades on the basis of direction, we try to separate trades generated by institutions versus individuals. To identify institutional trades, we impose a minimum dollar value transaction size to be more likely to capture trades involving institutional investors. Lee and Radhakrishna find that a cut-off value of $20,000 for small stocks is most effective in capturing institutional investor flow, as 84% of individual investor trades are found to be below this dollar value, and 67% of institutional investor trades are found to be greater than $10,000 in magnitude. We therefore use $20,000 as the minimum dollar value transaction size for institutional trades.

To identify individual retail trades, we again refer to Lee and Radhakrishna. They find that a maximum trade size of $2,500 is most effective in capturing individual investor flow, and we use this figure as the maximum dollar value transaction size, in order to represent individual investor flow. In the tests below, we are agnostic about whether institutional or individual demand is the important control. We try both in all cases.

Finally, it is useful to normalize the TAQ flows so that they are comparable with each other in a cross-sectional sense, and with the SSB flows across data sets. To do this, we first normalize TAQ flows into a given fund by dividing by fund market capitalization. The flows are then cumulated to form weekly observations. To make the TAQ and SSB flows comparable across funds, we further normalize the TAQ flows by multiplying them by the relative standard deviations of the flows on a fund-by-fund basis, s_{SSBi} / s_{TAQi}. As can be seen from Tables 1a and 1b, the variability of the TAQ flows as a percentage of market capitalization, is much greater than that for the SSB flows. This may reflect the fact that we observe essentially all institutional turnover in the closed-end funds, whereas we see only a fraction of institutional turnover in local countries using the SSB flow data.

Table 1a
Descriptive Statistics for Countries

This table presents descriptive statistics at the country level. The sample consists of cross-border equity flows and closed-end country fund NAV's and prices for 39 NYSE and AMEX traded funds from 25 countries from August 1, 1994 to December 24, 1998. The cross-border flow data are derived from proprietary data provided by State Street Bank & Trust (SSB). The first two data columns report the mean and standard deviation of the net amount traded each week divided by the previous week's country MSCI market capitalization, which we report in basis points. The third and fourth data columns report means (m) and standard deviations (s) of weighted closed-end fund discounts = ln(NAV/price) (denoted D), expressed as percentages, for all the funds pertaining to a country. The weights are derived from the market capitalizations of the funds as reported in CRSP. Columns five and six and seven report the correlations (r), in percentage terms, between the SSB net weekly inflow (denoted F), the weighted change in the ln(NAV) (denoted ΔN), the weighted change in the ln(price) (denoted ΔP) of all the funds in each country, and the weighted net weekly TAQ Flows (denoted T) into all the funds in each country respectively.

Region	m_F basis points	s_F basis points	m_D (%)	s_D (%)	$r_{F,\Delta N}$ (%)	$r_{F,\Delta P}$ (%)	$r_{F,T}$ (%)
Developed Markets							
Australia	0.33	1.02	18.6	4.7	30.7	29.3	8.1
Austria	0.54	3.40	20.0	4.9	-14.6	-16.1	-9.0
Germany	0.51	1.62	22.1	3.9	10.5	10.1	10.8
Ireland	1.93	3.51	15.4	5.2	-0.5	-0.7	10.6
Italy	0.81	1.93	17.1	4.4	-7.1	-8.1	6.2
Japan	0.40	0.84	-7.9	8.5	10.8	18.7	17.3
Spain	0.20	1.36	18.1	5.6	-9.6	-6.6	5.7
Switzerland	0.58	2.42	16.2	6.4	-15.0	-18.6	6.2
Emerging Markets							
Latin America							
Argentina	0.19	1.15	8.5	11.5	-6.7	15.6	15.4
Brazil	0.52	4.01	12.7	12.0	11.5	12.5	14.2
Chile	0.07	0.22	15.5	7.1	12.1	16.5	-1.0
Mexico	0.38	1.16	13.6	14.2	-7.5	-2.9	15.9
Emerging East Asia							
Indonesia	0.79	1.95	-15.4	22.5	24.2	23.8	3.0
Korea	0.86	2.45	0.2	10.6	2.7	2.7	4.2
Malaysia	0.34	1.68	-6.6	23.3	14.1	17.1	30.2
Philippines	0.93	1.85	16.4	8.3	29.2	32.1	-2.6
Singapore	0.49	1.73	0.0	7.2	3.4	2.8	1.2
Taiwan	0.13	0.35	8.6	13.1	-8.3	-10.6	9.9
Thailand	0.77	2.07	-15.3	31.3	-8.0	-5.4	1.4
Emerging Europe							
Portugal	1.58	4.52	16.2	7.7	-6.3	-7.9	11.4
Turkey	0.57	1.64	0.8	15.7	-20.2	-3.5	-6.8
Other Emerging Markets							
India	0.12	0.51	5.0	12.4	3.8	23.3	13.3
Israel	0.29	1.02	12.8	11.1	15.7	20.8	-8.4
Pakistan	1.06	2.06	15.7	10.8	1.9	10.8	5.6
South Africa	0.58	0.70	21.4	3.2	11.4	13.5	-3.7
Mean	**0.60**	**1.81**	**9.2**	**10.6**	**3.1**	**6.8**	**6.4**

Table 1b
Descriptive Statistics for Closed-End Country Funds

This table presents descriptive statistics at the level of individual funds. The sample consists of cross-border equity flows and closed-end country fund NAV's and prices for 39 NYSE and AMEX traded funds from 25 countries from August 1, 1994 to December 24, 1998. The flow data are derived from the TAQ database (TAQ), which reports all trades and quotes in each individual stock. The first two data columns report the mean and standard deviation of the net amount traded each week divided by the previous week's fund market capitalization (from CRSP), which is reported in basis points. The third and fourth data columns report means (m) and standard deviations (s) of weighted discount = ln(NAV/price) (denoted D), expressed as percentages, for all the funds pertaining to a country. The weights are derived from the market capitalization of the funds. Columns five and six report the correlations (r), in percent, between the TAQ net weekly inflow (denoted T), the change in ln(NAV) (denoted ΔN) and the change in ln(price) (denoted ΔP) of all the funds in each country, respectively.

Regions and Funds	m_T basis points	s_T basis points	m_D (%)	s_D (%)	$r_{T,\Delta N}$ (%)	$r_{T,\Delta P}$ (%)
Developed Markets						
First Australia Fund	-6.70	36.07	18.6	4.7	1.6	9.2
Austria Fund	-151.64	113.75	20.0	4.9	34.7	28.6
Germany Fund	-14.67	36.47	17.8	4.0	17.7	26.3
New Germany Fund	-15.67	34.02	23.4	3.9	0.7	13.6
Irish Investment Fund	-1.38	30.72	15.4	5.2	-6.2	-0.4
Italy Fund	-3.97	51.03	17.1	4.4	7.8	10.5
Japan Equity Fund	4.68	47.55	-11.2	8.4	18.0	23.0
Japan OTC Equity Fund	-5.10	34.01	-6.5	9.1	1.1	7.0
Spain Fund	-30.82	60.84	18.1	5.6	-33.1	-34.3
Swiss Helvetia Fund	-10.73	29.55	16.2	6.4	-1.7	2.8
Emerging Markets						
Latin America						
Argentina Fund	3.04	47.35	8.5	11.5	-4.0	17.6
Brazil Fund	-1.85	56.20	12.9	12.0	22.4	37.8
Brazilian Equity Fund	6.29	82.92	11.2	12.1	4.9	9.1
Chile Fund	-5.09	37.06	15.5	7.1	19.4	22.8
Mexico Equity & Income Fund	-3.00	47.70	12.2	15.9	3.5	16.9
Mexico Fund	5.89	46.68	15.0	13.2	-21.2	7.5
Emerging East Asia						
Indonesia Fund	6.29	59.46	-22.9	23.2	2.8	2.9
Jakarta Growth Fund	-0.17	35.53	-8.9	20.9	1.7	2.9
Fidelity Advisor Korea Fund	-12.39	103.58	2.0	9.6	0.1	0.1
Korea Equity Fund	-4.01	53.91	0.2	11.9	-5.4	-3.0
Korea Fund	3.93	64.25	-7.7	8.0	8.3	12.4
Korean Investment Fund	-4.81	66.15	0.3	11.0	13.0	15.8
Malaysia Fund	-18.86	51.42	-6.6	23.3	-13.4	-11.8
First Philippine Fund	-4.68	38.34	16.4	8.3	19.1	19.2
Singapore Fund	-1.58	43.21	0.0	7.2	16.6	19.4
ROC Taiwan Fund	0.44	57.72	8.3	12.8	6.7	6.2
Taiwan Equity Fund	-7.19	68.71	13.4	13.3	-5.0	6.0
Taiwan Fund	6.37	72.24	8.4	15.3	5.3	23.7
Thai Capital Fund	4.52	50.26	-8.9	22.7	-6.3	-5.6
Thai Fund	-1.40	37.81	-15.3	31.3	-2.7	0.7

Table 1b *(continued)*

Regions and Funds	m_T basis points	s_T basis points	m_D (%)	s_D (%)	$r_{T,\Delta N}$ (%)	$r_{T,\Delta P}$ (%)
Emerging Europe						
Portugal Fund	-4.29	61.92	16.2	7.7	-7.4	-7.5
Turkish Investment Fund	-6.76	64.32	0.8	15.7	-1.0	7.5
Other Emerging Markets						
India Fund	-4.17	47.29	10.5	11.3	6.0	18.0
India Growth Fund	1.29	53.83	1.0	14.5	3.8	13.6
Jardine Fleming India Fund	-0.97	55.56	6.8	11.4	19.7	29.6
Morgan Stanley India Inv. Fund	-8.49	42.23	5.4	13.0	9.4	25.7
First Israel Fund	-5.63	39.14	12.8	11.1	-10.4	-4.7
Pakistan Investment Fund	-11.37	54.40	15.7	10.8	10.0	17.9
Southern Africa Fund	-7.47	50.10	21.4	3.2	19.1	20.1
Mean	**-7.91**	**53.02**	**7.2**	**11.4**	**3.9**	**10.4**

Table 1c
Descriptive Statistics for Closed-End Country Funds (Contd.)

This table presents descriptive statistics at the level of individual funds. The sample consists of cross-border equity flows and closed-end country fund NAV's and prices for 39 NYSE and AMEX traded funds from 25 countries from August 1, 1994 to December 24, 1998. The flow data are derived from the TAQ database (TAQ), which reports all trades and quotes in each individual stock. The first two data columns report the mean and standard deviation of the net amount traded each week divided by the previous week's fund market capitalization (from CRSP), reported in basis points. The third and fourth data columns report the correlations (r), in percentage terms, between the TAQ net weekly *individual investor* inflow (denoted I), the change in ln(NAV) (denoted ΔN) and the change in ln(price) (denoted ΔP) of all the funds in each country, respectively.

	m_I	s_I	$r_{I,\Delta N}$	$r_{I,\Delta P}$
Regions and Funds	**basis points**	**basis points**	**(%)**	**(%)**
Developed Markets				
First Australia Fund	-3.16	38.61	9.26	11.01
Austria Fund	-10.73	54.35	5.07	-0.47
Germany Fund	-1.92	5.17	16.94	14.58
New Germany Fund	-0.57	2.61	-5.30	3.47
Irish Investment Fund	-0.18	13.26	-11.80	-11.14
Italy Fund	0.19	13.71	16.29	17.04
Japan Equity Fund	5.74	91.86	-7.40	-9.11
Japan OTC Equity Fund	-3.59	47.21	7.91	10.78
Spain Fund	-2.46	7.04	3.23	3.27
Swiss Helvetia Fund	0.11	2.87	7.07	11.95
Emerging Markets				
Latin America				
Argentina Fund	-3.57	42.99	1.38	12.63
Brazil Fund	-1.16	16.07	14.57	17.06
Brazilian Equity Fund	-9.91	152.66	16.45	17.18
Chile Fund	-0.30	1.02	59.21	62.94
Mexico Equity & Income Fund	-8.04	94.31	13.27	16.12
Mexico Fund	-2.10	26.38	4.83	10.64
Emerging East Asia				
Indonesia Fund	-9.00	122.69	10.42	13.06
Jakarta Growth Fund	-9.33	120.51	12.21	15.50
Fidelity Advisor Korea Fund	-1.67	33.14	1.08	1.08
Korea Equity Fund	-6.22	87.40	6.29	8.37
Korea Fund	-0.27	5.30	2.14	5.19
Korean Investment Fund	-4.82	54.06	7.03	10.19
Malaysia Fund	-8.87	112.24	13.35	15.31
First Philippine Fund	-4.91	65.49	11.33	13.18
Singapore Fund	-10.22	143.46	7.86	10.84
ROC Taiwan Fund	1.03	18.30	-13.19	-14.50
Taiwan Equity Fund	-1.99	29.49	1.25	7.65
Taiwan Fund	0.04	0.76	-15.17	3.50
Thai Capital Fund	-20.80	294.07	9.53	11.23
Thai Fund	-2.35	24.62	15.65	17.01

Table 1c *(continued)*

Regions and Funds	m_I basis points	s_I basis points	$r_{I,\Delta N}$ (%)	$r_{I,\Delta P}$ (%)
Emerging Europe				
Portugal Fund	-1.53	12.82	-4.98	-3.65
Turkish Investment Fund	-8.05	113.37	3.95	14.30
Other Emerging Markets				
India Fund	-1.93	21.51	6.37	13.05
India Growth Fund	-4.19	54.41	7.42	12.21
Jardine Fleming India Fund	-0.63	6.04	18.34	22.70
Morgan Stanley India Inv. Fund	-2.34	27.88	5.67	12.28
First Israel Fund	0.41	12.96	2.63	-0.33
Pakistan Investment Fund	-17.01	246.41	14.71	15.67
Southern Africa Fund	-8.13	120.89	18.35	17.74
Mean	**-4.22**	**59.95**	**7.52**	**10.50**

III. Econometric Models and Tests

In order to analyze questions about price pressure and information, we use a vector error correction model (VECM), along the lines suggested by Engle and Granger (1987). The reasoning is as follows. First, we wish to allow for the possibility that both cross-border flows and TAQ institutional flows are endogenous, as they are likely to be functions of one another and of prices. This is consistent with a VAR or VECM system.

Second, a normal vector autoregression of prices, NAVs, and flows is not appropriate, given that prices and NAVs on a given fund are linked. While, it is natural to think of both the prices and NAVs of closed-end funds as being nonstationary – over long periods the standard deviation of outcomes increases with time – the deviation between prices and NAVs (i.e., the closed-end fund discount) is stationary over long periods. Given the stationarity of the closed-end fund discount, we need to keep track of it in our VAR, since expected future changes in prices and flows may be importantly affected by the current size of the discount. And clearly, the size of the discount will be correlated with past changes in prices and NAVs.

Our particular VECM setup relies on a system of four endogenous variables: log changes in fund NAVs (ΔN), log changes in fund prices (ΔP), SSB flows *(F)*, and fund flows *(T)*. Note that for fund flows, we use either our definition of institutional or individual TAQ trades to ensure that we have controlled for sentiment and price pressure shifts in closed-end fund shares. In most of the tests, we have reduced the number of endogenous variables to three, replacing log changes in NAVs and prices with the difference between them, the log change in the discount ($\Delta D = \Delta N - \Delta P$). We interpret the discount as the deviation from fundamentals, the variable affected by flows under the price pressure hypothesis, but not under the information hypothesis.

In some instances, however, we gain by reverting back to all four endogenous variables. That is because, by inspecting changes in NAV and price separately, we can establish more about our ability to discern small changes in the discount. However, for most other purposes, the dynamics of the discount (and not its components) in interaction with the flows are what we care about. So a three-variable system serves as our main workhorse.

The 3-equation VECM uses

$$y_{it} = \begin{bmatrix} \Delta D_{it} \\ F_{it} \\ T_{it} \end{bmatrix}$$

where

$$y_{it} = \Gamma_a + \Gamma_D D_{t-1} + \Gamma(L) y_{it-1} + \Gamma_x x_{it} + e_{it},$$

$$\Gamma_i = \begin{bmatrix} d_i \\ f_i \\ t_i \end{bmatrix} \; i = a, D, \;\; \Gamma(L) = \begin{bmatrix} d_{\Delta D}(L) & d_F(L) & d_T(L) \\ f_{\Delta D}(L) & f_F(L) & f_T(L) \\ t_{\Delta D}(L) & t_F(L) & t_T(L) \end{bmatrix}, \;\; \Gamma_x = \begin{bmatrix} d_{us} \\ f_{us} \\ t_{us} \end{bmatrix}.$$

The coefficient matrix $\Gamma(L)$ is a 3x(3p) matrix of coefficients, where L is the lag operator, p is the maximum lag length, and Γ_x is a 3x2 matrix of coefficients. The vector x is comprised of regressors that have been shown to be important in determining closed-end fund and related discounts. Specifically, we use contemporaneous US index returns. 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 US market. They are included under the hypothesis that index changes are exogenous components of discounts and flows into both countries and closed-end funds. However, such an exogeneity assumption is likely to be problematic, since flows into countries may simultaneously determine both NAVs and country-index returns. Thus, in some of the specifications below, we may omit the index returns from the specification. [2]

In our econometric specifications, we constrain the coefficient estimates to be the same for all funds in each of the regions for which we present results. We remove 'within' means before estimation, thus creating fund-specific fixed effects. Essentially, we run the VECM using OLS equation-by-equation for our unbalanced panels. We correct for the possibility of heteroskedasticity in each of the individual residuals by constructing a White estimator for the variance of our coefficient point estimates. We correct for correlation across funds and for own-autocorrelation of residuals.

We will be interested in investigating several aspects of the system above. First, we want to distinguish among several hypotheses concerning the trend-chasing behavior of portfolio flows. Previous work has found that flows exhibit trend chasing in that they respond positively to past flows over and above any persistence in flows. Thus, we can ask whether there is evidence of trend chasing when returns are measured as deviations from fundamentals. Such a measure would seem important for behavioral models of asset prices, such as Hong and Stein (2000) and Barberis and Shleifer (2000), where trend-chasing demands play an important role in determining equilibrium prices. Empirical evidence in Froot, O'Connell, and Seasholes (2001) suggests that trend chasing in institutional flows is statistically significant, although economically small.

Note that trend chasing in cross-border flows can be interpreted in more than one way in the equations above. One interpretation is that, all else equal, a *higher* closed-end fund discount should be associated with greater future cross border inflows. (For the TAQ flows on the NYSE, trend chasing would imply that a higher discount should be associated with *lower* future TAQ inflows.) This interpretation is probably closest to that in Barberis and Shleifer (2000), in so far as a higher discount implies that the price of equities in the foreign country is *relatively* high. In terms of the coefficients specified above, this would lead us to expect $f_D > 0$ in the cross-border flow equation and $t_D < 0$ in the TAQ flow equation.

Of course, this is only a partial interpretation of trend chasing. Since the f_D and t_D coefficients assume that current and recent lagged *changes* in NAVs and prices are held fixed, it picks up trend following only at low frequencies, i.e., in response to a change in the discount, but holding constant recent changes in NAVs and prices. What happens with a higher frequency increase in the discount? Clearly, to get the total effect of a recent change, we must sum the error-correction coefficient along with the lag coefficients. If, for example, we consider the total impact of an increase in the discount in the last week, the appropriate coefficient to apply is the sum of the coefficient on the discount plus that on the lagged change in the discount, $f_D + f_{\Delta D}(1)$ in the cross-border flow equation and $t_D + t_{\Delta D}(1)$ in the closed-end fund flow equation. Similarly, the impact of a unit change over the last p weeks

[2] We have tried several ways of estimating these equations, 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), though it does make sense to ask flows to explain returns on closed-end funds in excess of the market. Another way to structure the VECM is to replace the closed-end fund returns with returns in excess of the market.

is given by $f_D + \sum_{i=1}^{p} f_{\Delta D}(i)$ for the cross-border flow equation and $t_D + \sum_{i=1}^{p} t_{\Delta D}(i)$ in the closed-end fund equation. If these sums are, respectively, positive and negative in the two equations, respectively, then there is evidence of trend following at shorter horizons. If, however, neither sum is of the correct sign, then it suggests that flows are trend-reversing, or "stabilizing." For example, if an increase in the discount leads to fewer cross-border inflows and greater closed-end fund inflows, then there is no trend chasing; the flows act as if to discipline discounts and help stabilize their values.

A second issue of interest, in addition to trend chasing, is the persistence of the two sources of flow into NAV and price.[3] Specifically, we can ask whether an inflow into the foreign equity market is persistent, and whether that persistence depends on flows into the closed-end fund shares as well as flows into the foreign equity market. If there is persistence and the fund and underlying assets act as complements in portfolios, then recent flows into either the local market or into the closed-end fund should forecast future flows into both. If there is persistence and the fund and underlying assets behave more as substitutes in investor portfolios, then an inflow into the local market should forecast both further inflows into the local market and *outflows* from the closed-end fund. This means that we are interested in the sign and significance of the coefficients $f_F(L)$, $f_T(L)$ and $t_F(L)$, $t_T(L)$ in the cross-border flow and closed-end fund flow equations above.

The third area of investigation concerns the source of forecasting power of flows for future returns. If flows forecast returns only because of future price impacts associated with expected follow-on flows, we say that price pressure – not information – is temporarily driving up prices. Under this scenario, we would expect cross-border inflows to forecast NAV changes and closed-end fund inflows to forecast fund price changes. Since we are holding constant the closed-end fund flows, we would not expect cross-border flows to forecast future closed-end fund price changes under the price pressure hypothesis. Similarly, we would expect closed-end fund inflows to forecast future returns in closed-end fund prices, but not returns in the underlying local markets. These statements imply that we interpret the price pressure hypothesis as saying $d_F(L) > 0$ and $d_T(L) < 0$.

Under the information story, of course, cross-border flows forecast changes in fundamentals, and not simply further price pressure. As a result, we should see that these flows forecast changes in NAVs and closed-end fund prices equally well. Similarly, any forecasting power of closed-end fund flows for prices should also be reflected in forecasting power for NAVs. Thus, the null hypothesis – what we are calling the information hypothesis – implies that $d_F(L) = 0$ and $d_T(L) = 0$.

In most instances, it is difficult to determine whether a failure to reject the null is attributable to low power or truth of the null hypothesis. Here, we have a secondary check available if it turns out that we cannot reject the null that $d_F(L) = 0$ and $d_T(L) = 0$. We can estimate what are essentially the components of $d_F(L)$ and $d_T(L)$ to see whether there is evidence that flows move the components of the discount equally, and thus do not move the discount itself. We do this by splitting the first equation, the change in the discount, ΔD, into its constituents, changes in NAVs, ΔN, and changes in closed-end fund prices, ΔP. Specifically, the 4-equation VECM is:

[3] For evidence on the persistence of the flows of institutional investors, see Froot, O'Connell, and Seasholes (2001).

$$y_{it} = \begin{bmatrix} \Delta N_{it} \\ \Delta P_{it} \\ F_{it} \\ T_{it} \end{bmatrix}$$

where

$$y_{it} = \Gamma_a + \Gamma_D D_{t-1} + \Gamma(L) y_{it-1} + \Gamma_x x_{it} + e_{it},$$

$$\Gamma_i = \begin{bmatrix} h_i \\ r_i \\ f_i \\ t_i \end{bmatrix} \; i = a, D, \;\; \Gamma(L) = \begin{bmatrix} h_{\Delta N}(L) & h_{\Delta P}(L) & h_F(L) & h_T(L) \\ r_{\Delta N}(L) & r_{\Delta P}(L) & r_F(L) & r_T(L) \\ f_{\Delta N}(L) & f_{\Delta P}(L) & f_F(L) & f_T(L) \\ t_{\Delta N}(L) & t_{\Delta P}(L) & t_F(L) & t_T(L) \end{bmatrix}, \;\; \Gamma_x = \begin{bmatrix} h_{us} \\ r_{us} \\ f_{us} \\ t_{us} \end{bmatrix}.$$

The coefficient matrix $\Gamma(L)$ is now a 4x(4p) matrix of coefficients, and Γ_x is now a 4x1 matrix of coefficients. Everything else is the same as in the 3-equation system above.

Under the information hypothesis we have that $h_F(L) = r_F(L) > 0$ if there is information in the cross-border flows, and $h_T(L) = r_T(L) > 0$ if there is information in the closed-end fund flows. Thus, we can ask whether the data are able to detect evidence of own informativeness of flows before we take a failure to reject $d_F(L) = 0$ and $d_T(L) = 0$ as evidence of the information hypothesis.

One additional caveat should be added. To distinguish between the price pressure and information hypotheses, we need to assume that closed-end fund prices are a good control – up to their own price pressure effects – for the fundamental movements of NAVs. That is, our tests assume that the only things that drive both NAVs and prices are different sources of price pressure and one set of fundamentals. Since we are controlling separately for price pressure in NAVs and prices, and since NAVs and prices share the same underlying fundamentals, our tests are useful. However, if there are unobserved sources of closed-end fund price pressure that are correlated with cross-border flows, then closed-end fund prices may not be a good control of NAV fundamentals.

To take an example, suppose that in equilibrium closed-end fund prices are set mechanically with reference to NAVs. Sometimes this is attributable to a change in fundamentals, but sometimes it is attributable to a change in NAV price pressure, which is then transmitted to prices through a change in demand for closed-end funds. In this case, the NAV price pressure induced by cross-border flows appears in the closed-end fund price, although measured flows into or out of the closed-end fund do not occur. In this example, our VECM coefficients would show that cross-border flows predicted both future NAV and price changes, but did not predict changes in the closed-end fund discount. One would conclude that the results line up with the information story, but this would be incorrect, since we posited that price pressure was behind the change in NAV. While our tests are subject to this criticism, the 'mechanical movement' hypothesis is not very appealing. After all, it does not state why closed-end fund demand would rise or fall because of price pressure in the NAV (and not in the closed-end fund price itself).

IV. Estimates and Interpretations of the Results

a. Unit Root Tests

It is obligatory, but rarely informative, to show results of unit root tests for the individual series, in this case NAVs, NYSE and AMEX prices, and cumulated flows from both the SSB and TAQ databases. We therefore test to see that prices and NAVs appear non-stationary while discounts appear stationary. To do this, we perform Dickey Fuller unit root tests on the natural logs of closed-end fund prices and NAVs. We then test for the stationarity of closed-end fund discounts, the difference between ln(NAV) and ln(price). In addition, we test the SSB and TAQ cumulated net flows for the presence of unit roots.[4]

Table 2a presents the results and shows that, as expected, we cannot reject the null unit-root hypothesis in prices and NAVs. Specifically, we find that across the 39 funds, we can reject the unit root hypothesis only once in 78 tests at the 5% level of significance. Aggregation across funds does little to change the results. This is not the case for the closed-end fund discounts, for which unit root test results are also reported in Table 2a. Across the 39 funds, we reject the null hypothesis of a unit root in discounts in 27 funds at the 10% level and 23 funds at the 5% level. Discounts are pretty clearly stationary, even in these relatively short time-series samples.

The tests in Table 2a confirm those of Hardouvelis, La Porta and Wizman (1994), who use Stock and Watson (1988) unit root tests, using specifications both with and without a time trend, and using up to 8 lags. They find that they can reject the hypothesis of non-stationarity of the discount for most of the country funds in their sample. This is a useful confirmation, since 29 of our 39 funds overlap. HLW's total sample consists of 35 funds. In addition, their sample period immediately precedes ours, so that our tests provide a supplementary confirmation of the stationarity of discounts.

As for the flows, Table 2b shows that we only reject the presence of a unit root in either cumulated SSB flows or cumulated TAQ flows once in 50 tests at the 5% level of significance. Clearly, cumulated flows of both kinds appear non-stationary.

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4 We incorporate a trend and an intercept term in the specification of all the Unit Root tests, as price series would be expected to contain a trend component. Further, we do not use an augmented Dickey-Fuller specification, as inspection of the partial autocorrelation coefficients in the correlograms of all the series under consideration reveals no significant partial autocorrelations past the first lag.

Table 2a
Unit Root Tests for Closed-End Country Funds

This table presents Dickey-Fuller unit root test results for ln(NAV) (first data column, denoted *N*), ln(price) (second data column, denoted *P*) and Discounts = ln(NAV/price) (third data column, denoted *D*) of the closed-end country funds in our dataset. In all cases, the specification is:

$\Delta y_t = a + mt + g y_{t-1} + e_t$, where *t* is a time trend, and a is the intercept term. We test $H_0: \hat{g} = 0$, $H_1: \hat{g} < 0$, and report the t-statistic of $\hat{g}$ in each case. Rejections of the null hypothesis of a unit root at the 5% critical level are identified in **bold**, and rejections at the 10% critical level are identified as underlined. These critical values are taken from MacKinnon (1991).

Regions and Funds	t ($\hat{g}_N$)	t ($\hat{g}_P$)	t ($\hat{g}_D$)
Developed Markets			
First Australia Fund	-1.92	-2.62	**-4.03**
Austria Fund	-2.39	-3.29	**-4.42**
Germany Fund	-3.05	-3.22	**-4.95**
New Germany Fund	-2.38	-2.78	**-4.73**
Irish Investment Fund	-1.96	-2.94	**-5.20**
Italy Fund	-2.64	-2.75	**-7.38**
Japan Equity Fund	-2.07	-3.36	**-4.35**
Japan OTC Equity Fund	-1.62	**-4.11**	**-4.00**
Spain Fund	-3.09	-2.91	**-3.48**
Swiss Helvetia Fund	-2.66	-2.42	**-5.68**
Emerging Markets			
Latin America			
Argentina Fund	-2.25	-2.47	**-5.46**
Brazil Fund	-1.70	-2.41	-2.21
Brazilian Equity Fund	-1.13	-1.66	**-5.42**
Chile Fund	-1.27	-1.16	<u>-3.23</u>
Mexico Equity & Income Fund	-1.49	-1.89	-2.93
Mexico Fund	-2.13	-2.27	**-4.69**
Emerging East Asia			
Indonesia Fund	-1.39	-2.22	-2.19
Jakarta Growth Fund	-1.27	-1.66	-2.29
Fidelity Advisor Korea Fund	-1.57	-2.01	**-3.81**
Korea Equity Fund	-1.80	-2.02	<u>-3.37</u>
Korea Fund	-2.06	-2.57	**-4.48**
Korean Investment Fund	-2.03	-2.47	<u>-3.34</u>
Malaysia Fund	-1.11	-1.23	-2.56
First Philippine Fund	-1.60	-1.74	**-4.30**
Singapore Fund	-1.54	-2.55	**-4.46**
ROC Taiwan Fund	-1.24	-2.38	-2.86
Taiwan Equity Fund	-1.69	-2.78	-2.58
Taiwan Fund	-1.35	-2.36	-2.48
Thai Capital Fund	-2.02	-2.56	**-3.68**
Thai Fund	-1.83	-2.23	**-3.49**
Emerging Europe			
Portugal Fund	-2.07	-2.57	**-3.82**
Turkish Investment Fund	-2.16	-2.47	**-4.57**
Other Emerging Markets			
India Fund	-1.79	-3.33	-2.44
India Growth Fund	-2.01	-3.37	-2.51
Jardine Fleming India Fund	-1.91	-2.59	<u>-3.21</u>
Morgan Stanley India Inv. Fund	-2.06	-2.39	-2.39
First Israel Fund	-2.00	-3.31	**-4.85**
Pakistan Investment Fund	-1.40	-1.24	-2.96
Southern Africa Fund	-1.05	-1.24	**-5.73**

Table 2b
Unit Root Tests for Flow Series

This table presents Dickey-Fuller unit root test results for the State Street Bank cumulative flows into the country (first data column, denoted *F*), institutional TAQ weighted cumulative flows in the U.S. into the country funds (second data column, denoted *T*), and individual investor TAQ weighted cumulative flows in the U.S. into the country funds (third data column, denoted *I*), where the weights are derived from the country fund market capitalizations of all the funds in each country. In all cases, the specification is:

$\Delta y_t = a + mt + gy_{t-1} + e_t$, where t is a time trend, and a is the intercept term. We test $H_0: \hat{g} = 0$, $H_1: \hat{g} < 0$, and report the t-statistic of $\hat{g}$ in each case. Rejections of the null hypothesis of a unit root at the 5% critical level are identified in **bold**, and rejections at the 10% critical level are identified as underlined. These critical values are taken from MacKinnon (1991).

Region	t ($\hat{g}_F$)	t ($\hat{g}_T$)	t ($\hat{g}_I$)
Developed Markets			
Australia	-0.67	-1.96	-0.25
Austria	2.75	-2.06	-1.39
Germany	-0.84	-0.13	-1.57
Ireland	-1.34	-2.30	1.28
Italy	-1.17	-2.36	1.73
Japan	-0.41	-1.12	-0.47
Spain	-0.94	4.68	-1.53
Switzerland	-0.21	-1.42	-0.64
Emerging Markets			
Latin America			
Argentina	-0.22	-1.47	1.53
Brazil	-0.72	0.52	**3.91**
Chile	0.36	-0.17	**7.67**
Mexico	0.45	**-4.60**	**-5.65**
Emerging East Asia			
Indonesia	-0.12	-1.64	**3.81**
Korea	-1.19	-1.71	<u>3.40</u>
Malaysia	-0.22	-0.46	2.71
Philippines	1.77	-1.81	3.07
Singapore	-1.81	-2.97	2.90
Taiwan	-1.89	-0.79	0.16
Thailand	-1.32	-2.79	2.90
Emerging Europe			
Portugal	-1.62	-1.62	-2.31
Turkey	0.09	-2.21	0.21
Other Emerging Markets			
India	1.34	0.99	2.05
Israel	0.06	-1.07	-0.24
Pakistan	-0.70	0.52	2.66
South Africa	-2.97	0.34	2.73

b. VECM Results

First, Table 3a makes it clear that there is, as expected, strong mean reversion in the discount. Future changes in the discount are predicted negatively by past changes, but in addition, the level of the discount matters very significantly. Indeed, the coefficient estimates suggest that a 1% increase in the discount in the last week alone results in a one-week-ahead expected return of –20.4bp from the lagged discount change plus a –3.1bp expected return for each 1% deviation of the discount from zero. In addition to this, the higher-order coefficients d_{D2} and d_{D3} are both negative, though only the first is statistically significant. When we look at the four-variable system, we can see that much of the transitory deviation in closed-end fund discounts comes from reversion in price, not in NAV. This can be seen clearly in Tables 4a and 4b, and is implied by the findings of Hardouvelis, LaPorta, and Wizman (1994).

Second is the question of how the discount affects future changes in cross-border and closed-end fund flows. Tables 3b and 3c report estimates of f_D and t_D, respectively, as –0.63 and –0.29. The first of these implies that an increase of 1% in the discount results in an outflow from the local market equal to 0.62bp of market capitalization over the next week. This negative estimate of f_D says that cross-border flows display low-frequency *trend reversing*, not trend following. This is because an increase in the NAV relative to price results in a future *decline* in flows into the local market. However, the TAQ flows into closed-end funds yield the opposite result. There, an increase in the discount leads to a future decline in flows into the closed-end fund. This is consistent with trend following, in that an increase in the discount (i.e., a decline in the relative price of the closed-end fund) results in an outflow out of the fund. There is only weak evidence, however, in favor of trend following behavior, as the coefficient, t_D, is only marginally statistically significant.

The finding that the cross-border flows show trend reversing – not trend following – behavior, stands in contrast to that reported by see Froot, O'Connell and Seasholes (2001). The critical difference is that the latter paper measured the response of flows to past *absolute* returns, whereas this paper uses *relative* returns. Given the size, significance and pervasiveness across regions (see Table 3b) of the trend reversing effect, it is clear that the distinction between absolute and relative returns has an important impact.

Third, *recent* changes in discounts seem, if anything, to provide additional evidence that trend reversing, not trend following prevails with respect to relative returns. To see the impact of the coefficients, suppose that over the last week, the discount has increased by 1%. The expected change in cross-border flows is toward outflow, consistent with trend reversing behavior, with the estimate given by $f_D + f_{D1}$ = –0.63 –0.37 = –1.00bp (see Table 3b). This is a large amount of outflow relative to a flow standard deviation, especially since a 1% change in the discount is well below a discount standard deviation (see Table 1a above). The trend-reversing behavior in cross-border flows from NAVs *relative* to fundamentals is that much greater when we look at short-term changes in the discount.

As for closed-end fund flows (see Table 3c), the evidence supporting lower-frequency trend following remains weak at shorter horizons. Here, if the discount increases by 1% over the previous week, the total effect on closed-end fund flows is given by $t_D + t_{D1}$ = –0.29 – 0.34 = –0.63bp. (For closed-end fund flows, negative estimates indicate trend-following behavior.) While the point estimate remains negative, it is too small to register statistical or important economic significance.

We can take this investigation of trend-following and reversing behavior one step further by examining the Tables 4c and 4d in the four-variable system. In these tables, we can see cross-border flows and closed-end fund flows, respectively, as being driven by past changes in NAV and price, rather than simply by past changes in their difference, the discount. To start, note that Table 4c shows that the coefficient on the discount is essentially the same as in the three variable system, with f_D = -0.64. The first lag of the change in the NAV, however is *positive*, f_{N1} = 1.58, so that the total effect of a one-week change in NAV on cross-border flows is $f_D + f_{N1}$ = -0.65 +1.58 = 0.93 > 0. So cross-border flows do appear trend following with respect to recent changes in NAV. Furthermore, notice that the subsequent lag coefficients, f_{N2}, and f_{N3} are negative and quite large at -0.56 and -2.26, respectively. These coefficients mean that three weeks after a 1% increase in the NAV, the effect on cumulative flows is strongly negative (3x(-0.65)+1.58-.56-2.26 = -3.19). Thus, while NAV increases have short-term trend-following effects, this quickly erodes and the longer-term trend reversing effect dominates.

Interestingly, this trend-reversing response of cross-border flows to changes in NAVs is not at all similar to the response of the same cross-border flows to changes in prices. When closed-end fund prices increase, the cumulative effect on cross-border flows is a positive one. That is, the coefficients f_{P1}, f_{P2}, and f_{P3} in Table 4c are all positive (though weakly so). So a price increase leads to a cross-border inflow both by reducing the discount, and by increasing lagged price. Trend following behavior is apparent for cross-border flows with respect to closed-end fund prices. But since price changes affect discount changes negatively, the strength of this finding makes flows trend reversing with respect to discount changes (as we saw above in Table 3b).

Next, the estimates tell us something about the persistence of the flows after controlling for price changes relative to fundamentals. In the cross-border flow equation (Table 3b), the coefficients show strong evidence of long-lasting own persistence, with f_{F1}, f_{F2}, and f_{F3} all strongly statistically positive. In addition, there is some evidence of cross persistence, in that lagged closed-end fund flows are positively correlated with current cross border flows, even after controlling for lagged cross-border flows. However, only the first lag coefficient, f_{T1}, is estimated to be statistically positive, and its magnitude is relatively small. Nevertheless, this positive cross correlation suggests that the closed-end funds and underlying NAVs behave as complements rather than substitutes in portfolios. This finding is also reflected in the positive correlation between contemporaneous cross-border and closed-end fund flows, shown in Table 1a.

As for the persistence in closed-end flows, the evidence is in Table 3c. There is only very weak evidence of own-persistence: while all three of the lag coefficients, t_{T1}, t_{T2}, and t_{T3} are positive, none are statistically significant. However, there is no evidence of positive cross-correlation between lagged cross-border flows and current closed-end fund flows. None of the coefficients, t_{F1}, t_{F2}, and t_{F3} are statistically significant.

The finding of own persistence in the cross-border flow measures echoes that found in Froot, O'Connell, and Seasholes (2001). Institutional portfolios appear to have weekly own autocorrelation coefficients of between 0.1 and 0.2, and to have important higher-order positive partial autocorrelations as well.

Finally, we examine the estimates for evidence of the price-pressure vs. information hypotheses. The first thing of importance is in Table 3a – the cross-border flows show a slight, short-run ability to anticipate future changes in the discount. So there is some evidence of price pressure. Of the three flow coefficient estimates in that equation, d_{F1}, d_{F2}, and d_{F3}, only the first is statistically positive. Thus, there is a small amount of evidence of some price pressure: flows forecast discounts, though only slightly.

Of course, at this point it seems appropriate to look at the evidence of how cross-border flows forecast NAVs versus prices, the components of the discount. To see this, we examine Table 4a, which shows the sensitivities of future changes in NAV to the lagged discount, price changes and flows and Table 4b, which does the same for prices. In Table 4a, the coefficients h_{F1}, h_{F2}, and h_{F3} show the response of future NAVs to lagged flows. Here there is weak evidence that the flows have a large and statistically positive impact on NAVs, at least over the first few weeks. The size of the first coefficient, 0.0012 says that a 10 basis point increase in cross-border inflows, results in a 120 basis point increase over the following week in NAVs. Over the following week, the NAV is expected to rise an additional 60 basis points. In the third week the NAV is expected to fall, by 90 basis points. There seems to be information in cross-border flows for NAVs, much of which appears long lasting.

What about the information impact of the cross-border flows on closed-end fund prices? Table 4b shows that the coefficients r_{F1} and r_{F2} are both statistically positive, each with point estimates of 0.0008. Hence, a two-week change in flows has roughly the same impact on prices as it does on NAVs. In this sense there is strong support for the information hypothesis, even though there is a small amount of evidence supporting the price pressure view.

It is also useful to summarize these results in the form of impulse response functions. The impulse responses from the 3-equation system reported in Tables 3a – 3c are shown in Figure 1. The first thing to note is that the impulse response of the closed-end fund discount to a shock to cross-border flows shock (upper right-hand corner) shows essentially what the coefficients report: that there is only a small discernible positive change in discounts as a result of the cross-border flows.

Figure 2 shows the response of the discount's components – NAV and price – to the same shock to cross-border flows (upper right- and left-hand corners, respectively). These give a different impression than the discount response in Figure 1. Both NAV and price move strongly and positively subsequent to the shock to cross-border inflows. Much as shown by the coefficients above, this suggests that there is information in the flows. Future prices move virtually as much as future NAVs in response to a cross-border flow shock.

The same cannot be said of TAQ flows, shown in Figure 3. It is clear from the figure that the impulse responses of NAVs and prices to TAQ flow shocks show little discernable response. Cross-border flows appear to contain information, while closed-end fund flows appear to have little or no forecasting power.

The results above describe Tables 3 and 4, which employ institutional investor TAQ flows. Tables 5 and 6 are analogous, except that they contain individual investor TAQ flows instead. The results and conclusions above are very similar for both definitions of closed-end fund flow. The only meaningful difference is that the individual investor flows show much stronger persistence than the institutional flows.

V. Conclusions

This paper takes as given previous results that suggest that cross-border flows have predictive power for future local equity market returns. We then go several steps further. First, in view of the extreme persistence of flows, we try to ask whether the observed predictability is a result of current and future price pressure, or whether it presages an improvement in fundamentals. To address this question, we look at the *relative* return of closed-end fund NAVs in excess of their price traded in New York, i.e., the closed-end fund discount. At the same time, we try to control for demand effects that may impact the closed-end fund's price. To do this we create measures of institutional and individual flows into and out of closed-end funds. Having done this we can examine the symmetries and asymmetries of cross-border and closed-end fund flows for discounts.

Our results from this exercise are the following. First, we find that both types of flows show considerable persistence (e.g., positive partial autocorrelations), and even a small amount of cross-persistence. The persistence is much more pronounced, however, for the individual closed-end fund flows than for the comparable institutional flows.

Second, we find that the much-noted trend following behavior of flows seen in absolute returns, disappears once one investigates *relative* returns, where, by 'relative,' we mean in excess of fundamentals. Cross-border flows switch from displaying strong trend following behavior to strong trend reversing behavior when relative returns are used. This suggests that the cross-border flows do keep a measure of fundamentals in mind, and when mean-reverting discounts get unusually large, international investors sell the underlying assets, only to buy them more aggressively when the discounts are small. However, each piece of the relative return seems to respond at least over short periods in a positive way to positive past returns. In this sense our results are consistent with trend following behavior.

For closed-end fund flows, we find a more puzzling picture, though one that tends to rationalize the inefficiencies in closed-end fund prices found by Hardouvelis, LaPorta, and Wizman (1994). Ceteris-paribus, larger closed-end fund discounts (seen over long periods of time) seem to be associated with *outflows* from the funds themselves. Offsetting this somewhat is a shorter-term effect, which says that recent discount increases result in negligible closed-end fund flows.

Third, we find evidence that the predictability for local-market returns in cross-border flows appears mostly to be due to information rather than price pressure: the same predictable component that appears in NAVs appears in closed-end fund prices as well. Since we are controlling for price pressure in the closed-end fund price, we attribute most of the increase in value to a forecasted improvement in fundamentals. There is some evidence, nevertheless that NAVs move more than prices subsequent to a cross-border inflow. In this sense we find some evidence to support the existence of price pressure in local markets.

Finally, one should not go away without a sense for the weaknesses of our approach. The appeal of using closed-end fund prices to control for NAVs is that they share the same fundamentals, and that differences in demand shocks between the two may account for a good deal of discount variation. However, if we are to interpret the appreciation of foreign equities after a cross-border inflow as evidence of an improvement in common fundamentals, then we need to control for any correlated demand effects that may impact future closed-end fund prices. To the extent that we omit sources of closed-end fund demand shocks that are correlated with our cross-border flows, then we may mistakenly attribute the good performance of cross-border investors to information rather than price pressure.

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Table 3a
Vector Error-Correction Model Estimates: Discount Equation 1

This table presents results from the first equation of the vector error correction model estimates from a three endogenous variable system: closed-end fund discounts: ln(NAV/price) (*D*), net weekly flows *(F)*, and net institutional weekly flows into closed-end funds from the TAQ database *(T)*. The funds are matched to the flows by the country in which the funds specialize. The number of lags is set to three weeks. Each equation of the system is estimated separately, stacked across each regional group. Coefficients are restricted to be the same across all members of each group, though idiosyncratic intercepts are permitted. The system is estimated using OLS, with standard errors corrected for within fund heteroskedasticity and autocorrelation, and within region cross-fund contemporaneous correlation in the residuals. FX rates for conversion are obtained from WMR/Reuters using Datastream. SP represents returns on the S&P 500 index – contemporaneous and three weekly lags are included, though we do not report these coefficients. We report R^2 (degrees of freedom) in the final column. All data covers the period from August 5, 1994 to December 31, 1998. A complete list of funds, countries and regions is provided in the Appendix.

$$\Delta D_{it} = d_a + d_D[D_{it-1}] + d_{D1}\Delta D_{it-1} + d_{D2}\Delta D_{it-2} + d_{D3}\Delta D_{it-3} + d_{F1}F_{it-1} + d_{F2}F_{it-2} + d_{F3}F_{it-3}$$
$$+ d_{T1}T_{it-1} + d_{T2}T_{it-2} + d_{T3}T_{it-3} + d_{SP}SP_t + d_{SP1}SP_{t-1} + d_{SP2}SP_{t-2} + d_{SP3}SP_{t-3} + e_D$$

(*p-values below coefficients)*

Region	d_D	d_{D1}	d_{D2}	d_{D3}	d_{F1}	d_{F2}	d_{F3}	d_{T1}	d_{T2}	d_{T3}	R^2 (8783)
All	-0.0310	-0.2049	-0.0501	-0.0167	0.0006	0.0001	-0.0003	0.0000	0.0007	0.0005	0.08
	0.000	*0.000*	*0.060*	*0.399*	*0.060*	*0.832*	*0.311*	*0.921*	*0.010*	*0.080*	
Developed	-0.0970	-0.2381	-0.0721	-0.0627	0.0000	-0.0001	-0.0003	-0.0005	0.0005	-0.0002	0.14
	0.000	*0.000*	*0.055*	*0.030*	*0.900*	*0.873*	*0.279*	*0.096*	*0.102*	*0.405*	
Emerging	-0.0272	-0.1967	-0.0456	-0.0075	0.0008	0.0001	-0.0004	0.0001	0.0008	0.0007	0.07
	0.000	*0.000*	*0.123*	*0.735*	*0.043*	*0.818*	*0.392*	*0.710*	*0.036*	*0.047*	
Latin America	-0.0241	-0.3139	-0.1083	-0.0035	-0.0002	-0.0001	-0.0004	0.0003	0.0001	0.0003	0.12
	0.072	*0.000*	*0.027*	*0.952*	*0.479*	*0.931*	*0.410*	*0.604*	*0.894*	*0.530*	
Emerging East Asia	-0.0265	-0.1437	-0.0163	0.0000	0.0019	-0.0005	-0.0003	-0.0001	0.0017	0.0016	0.06
	0.002	*0.002*	*0.691*	*0.999*	*0.012*	*0.670*	*0.798*	*0.890*	*0.007*	*0.017*	
Emerging Europe	-0.0375	-0.3570	-0.1591	-0.0275	0.0001	0.0000	0.0000	0.0000	-0.0003	0.0000	0.15
	0.020	*0.000*	*0.003*	*0.579*	*0.784*	*0.963*	*0.930*	*0.931*	*0.475*	*0.994*	
Other Emerging	-0.0300	-0.2499	-0.0839	-0.0524	0.0007	0.0019	-0.0021	0.0007	0.0012	-0.0009	0.11
	0.022	*0.000*	*0.008*	*0.097*	*0.404*	*0.222*	*0.036*	*0.438*	*0.228*	*0.336*	

Table 3b
Vector Error-Correction Model Estimates: Flows Equation 2

This table presents results from the second equation of the vector error correction model estimates from a three endogenous variable system: closed-end fund discounts: ln(NAV/price) (*D*), net weekly flows *(F)*, and net institutional weekly flows into closed-end funds from the TAQ database *(T)*. The funds are matched to the flows by the country in which the funds specialize. The number of lags is set to three weeks. Each equation of the system is estimated separately, stacked across each regional group. Coefficients are restricted to be the same across all members of each group, though idiosyncratic intercepts are permitted. The system is estimated using OLS, with standard errors corrected for within fund heteroskedasticity and autocorrelation, and within region cross-fund contemporaneous correlation in the residuals. FX rates for conversion are obtained from WMR/Reuters using Datastream. SP represents returns on the S&P 500 index – contemporaneous and three weekly lags are included, though we do not report these coefficients. We report R^2 (degrees of freedom) in the final column. All data covers the period from August 5, 1994 to December 31, 1998. A complete list of funds, countries and regions is provided in the Appendix.

$$F_{it} = f_a + f_D[D_{it-1}] + f_{D1}\Delta D_{it-1} + f_{D2}\Delta D_{it-2} + f_{D3}\Delta D_{it-3} + f_{F1}F_{it-1} + f_{F2}F_{it-2} + f_{F3}F_{it-3}$$
$$+ f_{T1}T_{it-1} + f_{T2}T_{it-2} + f_{T3}T_{it-3} + f_{SP}SP_t + f_{SP1}SP_{t-1} + f_{SP2}SP_{t-2} + f_{SP3}SP_{t-3} + e_F$$

(p-values below coefficients)

Region	f_D	f_{D1}	f_{D2}	f_{D3}	f_{F1}	f_{F2}	f_{F3}	f_{T1}	f_{T2}	f_{T3}	R^2 (8783)
All	-0.6334	-0.3650	-0.7319	-2.1575	0.1690	0.1169	0.0788	0.0462	-0.0003	-0.0093	0.10
	0.018	*0.749*	*0.596*	*0.072*	*0.000*	*0.000*	*0.000*	*0.007*	*0.988*	*0.594*	
Developed	-0.3501	1.2207	1.2383	-3.1653	0.2450	0.0702	0.0940	-0.0476	-0.0082	0.0248	0.11
	0.567	*0.340*	*0.468*	*0.097*	*0.000*	*0.085*	*0.003*	*0.082*	*0.736*	*0.310*	
Emerging	-0.6354	-0.5862	-1.0151	-1.9734	0.1408	0.1323	0.0736	0.0816	0.0076	-0.0199	0.10
	0.023	*0.650*	*0.515*	*0.140*	*0.000*	*0.000*	*0.005*	*0.000*	*0.716*	*0.354*	
Latin America	-0.4360	-0.9428	-0.4469	-0.1361	0.0253	0.1564	0.0011	0.0784	0.0100	-0.0106	0.10
	0.458	*0.646*	*0.790*	*0.933*	*0.542*	*0.002*	*0.970*	*0.027*	*0.741*	*0.572*	
Emerging East Asia	-0.4473	-1.3928	-1.6541	-3.1674	0.2947	0.0599	0.1034	0.0538	-0.0237	-0.0219	0.17
	0.204	*0.432*	*0.465*	*0.115*	*0.000*	*0.272*	*0.012*	*0.021*	*0.451*	*0.278*	
Emerging Europe	-1.4115	0.9506	0.1010	0.7490	0.0006	0.0976	0.0964	0.1637	0.0567	0.0007	0.06
	0.093	*0.744*	*0.973*	*0.806*	*0.995*	*0.014*	*0.110*	*0.007*	*0.319*	*0.992*	
Other Emerging	-1.1323	0.4569	0.8209	-0.6251	0.1402	0.1456	0.1582	0.0485	0.0868	-0.0356	0.17
	0.000	*0.552*	*0.353*	*0.465*	*0.003*	*0.000*	*0.000*	*0.103*	*0.119*	*0.671*	

Table 3c

Vector Error-Correction Model Estimates: Institutional Investor TAQ Flows Equation 3

This table presents results from the third equation of the vector error correction model estimates from a three endogenous variable system: closed-end fund discounts: ln(NAV/price) (*D*), net weekly flows *(F)*, and net institutional weekly flows into closed-end funds from the TAQ database *(T)*. The funds are matched to the flows by the country in which the funds specialize. The number of lags is set to three weeks. Each equation of the system is estimated separately, stacked across each regional group. Coefficients are restricted to be the same across all members of each group, though idiosyncratic intercepts are permitted. The system is estimated using OLS, with standard errors corrected for within fund heteroskedasticity and autocorrelation, and within region cross-fund contemporaneous correlation in the residuals. FX rates for conversion are obtained from WMR/Reuters using Datastream. SP represents returns on the S&P 500 index – contemporaneous and three weekly lags are included, though we do not report these coefficients. We report R^2 (degrees of freedom) in the final column. All data covers the period from August 5, 1994 to December 31, 1998. A complete list of funds, countries and regions is provided in the Appendix.

$$T_{it} = t_a + t_D[D_{it-1}] + t_{D1}\Delta D_{it-1} + t_{D2}\Delta D_{it-2} + t_{D3}\Delta D_{it-3} + t_{F1}F_{it-1} + t_{F2}F_{it-2} + t_{F3}F_{it-3}$$

$$+ t_{T1}T_{it-1} + t_{T2}T_{it-2} + t_{T3}T_{it-3} + t_L L_{it} + t_{SP}SP_t + t_{SP1}SP_{t-1} + t_{SP2}SP_{t-2} + t_{SP3}SP_{t-3} + e_T$$

(p-values below coefficients)

Region	t_D	t_{D1}	t_{D2}	t_{D3}	t_{F1}	t_{F2}	t_{F3}	t_{T1}	t_{T2}	t_{T3}	R^2 (8783)
All	-0.2920	-0.3441	0.2323	0.5195	0.0038	0.0135	0.0006	0.0268	0.0072	0.0202	0.01
	0.107	*0.633*	*0.762*	*0.516*	*0.801*	*0.175*	*0.973*	*0.174*	*0.653*	*0.202*	
Developed	1.2630	0.8576	2.8542	4.9974	0.0000	0.0093	-0.0215	0.0222	0.0354	0.0262	0.01
	0.185	*0.420*	*0.053*	*0.240*	*0.998*	*0.513*	*0.260*	*0.209*	*0.025*	*0.341*	
Emerging	-0.3576	-0.6074	-0.2110	-0.2221	0.0049	0.0161	0.0097	0.0279	-0.0016	0.0194	0.01
	0.052	*0.453*	*0.804*	*0.709*	*0.805*	*0.209*	*0.671*	*0.289*	*0.940*	*0.342*	
Latin America	-1.9715	0.2010	3.6412	1.4677	0.0111	-0.0018	0.0080	-0.0655	-0.0242	-0.0410	0.02
	0.000	*0.946*	*0.122*	*0.371*	*0.653*	*0.941*	*0.862*	*0.384*	*0.379*	*0.295*	
Emerging East Asia	0.0257	-0.7410	-0.3989	-0.2956	0.0302	0.0347	-0.0288	0.0819	0.0373	0.0349	0.02
	0.905	*0.442*	*0.734*	*0.717*	*0.257*	*0.143*	*0.172*	*0.001*	*0.177*	*0.112*	
Emerging Europe	-1.1830	-3.6064	-2.0230	-0.0754	-0.0646	-0.0019	0.0627	0.0225	-0.0494	0.0550	-0.01
	0.305	*0.328*	*0.338*	*0.873*	*0.318*	*0.774*	*0.344*	*0.371*	*0.370*	*0.343*	
Other Emerging	-0.6667	0.4136	-0.5526	-0.6121	0.0326	0.0750	-0.0273	0.0541	0.0342	0.0388	0.03
	0.001	*0.652*	*0.422*	*0.350*	*0.385*	*0.106*	*0.505*	*0.502*	*0.574*	*0.432*	

Table 4a
Vector Error-Correction Model Estimates: NAV Equation 1

This table presents results from the first equation of the VECM estimates from a four endogenous variable system: ln(NAV (*N*), ln(price) (*P*), net weekly flows *(F)*, and net institutional weekly closed-end fund flows from the TAQ database *(T)*. The funds are matched to the flows by the country in which the funds specialize. The number of lags is set to three weeks. Each equation of the system is estimated separately, stacked across each regional group. Coefficients are restricted to be the same across all members of each group, though idiosyncratic intercepts are permitted. The system is estimated using OLS, with standard errors corrected for within fund heteroskedasticity and autocorrelation, and within region cross-fund contemporaneous correlation in the residuals. FX rates for conversion are obtained from WMR/Reuters using Datastream. SP represents returns on the S&P 500 index – contemporaneous and three weekly lags are included, though we do not report these coefficients. We report R^2 (degrees of freedom) in the final column. All data covers the period from August 5, 1994 to December 31, 1998. A complete list of funds, countries and regions is provided in the Appendix.

$$\Delta N_{it} = h_a + h_D[D_{it-1}] + h_{N1}\Delta N_{it-1} + h_{N2}\Delta N_{it-2} + h_{N3}\Delta N_{it-3} + h_{P1}\Delta P_{it-1} + h_{P2}\Delta P_{it-2} + h_{P3}\Delta P_{it-3}$$
$$+ h_{F1}F_{it-1} + h_{F2}F_{it-2} + h_{F3}F_{it-3} + h_{T1}T_{it-1} + h_{T2}T_{it-2} + h_{T3}T_{it-3} + h_{SP}SP_t + h_{SP1}SP_{t-1} + h_{SP2}SP_{t-2} + h_{SP3}SP_{t-3} + e_N$$

(*p-values below coefficients)*

Region	h_D	h_{N1}	h_{N2}	h_{N3}	h_{P1}	h_{P2}	h_{P3}	h_{F1}	h_{F2}	h_{F3}	h_{T1}	h_{T2}	h_{T3}	R^2 (8780)
All	-0.0137	-0.0611	0.0585	0.0589	0.0116	0.0614	0.0222	0.0012	0.0006	-0.0009	0.0001	0.0001	0.0003	0.11
	0.136	*0.103*	*0.217*	*0.160*	*0.759*	*0.061*	*0.501*	*0.007*	*0.113*	*0.028*	*0.713*	*0.809*	*0.226*	
Developed	-0.0286	-0.1459	0.0384	0.0562	0.0461	0.0033	-0.0370	0.0005	0.0000	-0.0001	-0.0007	0.0000	0.0002	0.16
	0.013	*0.000*	*0.404*	*0.126*	*0.107*	*0.908*	*0.169*	*0.122*	*0.983*	*0.824*	*0.012*	*0.942*	*0.275*	
Emerging	-0.0125	-0.0536	0.0564	0.0568	0.0056	0.0699	0.0314	0.0015	0.0009	-0.0012	0.0004	0.0001	0.0003	0.10
	0.191	*0.199*	*0.280*	*0.217*	*0.896*	*0.061*	*0.404*	*0.012*	*0.099*	*0.028*	*0.226*	*0.823*	*0.359*	
Latin America	-0.0033	-0.0376	0.1116	0.1323	0.0551	-0.0218	-0.0810	0.0005	0.0013	0.0002	0.0012	-0.0008	-0.0001	0.14
	0.896	*0.694*	*0.192*	*0.174*	*0.437*	*0.788*	*0.383*	*0.505*	*0.043*	*0.718*	*0.070*	*0.237*	*0.826*	
Emerging East Asia	-0.0120	-0.0535	0.0673	0.0592	-0.0550	0.0943	0.0706	0.0026	0.0007	-0.0029	0.0001	0.0012	0.0010	0.15
	0.317	*0.313*	*0.353*	*0.319*	*0.373*	*0.077*	*0.160*	*0.015*	*0.600*	*0.003*	*0.797*	*0.064*	*0.030*	
Emerging Europe	-0.0297	-0.1129	0.0540	0.0190	0.0553	0.0174	-0.0497	0.0004	0.0004	0.0001	-0.0002	-0.0009	0.0000	0.06
	0.173	*0.194*	*0.462*	*0.796*	*0.606*	*0.805*	*0.473*	*0.389*	*0.319*	*0.896*	*0.721*	*0.226*	*0.974*	
Other Emerging	-0.0172	0.0079	0.0122	0.0095	0.0871	0.0521	0.0126	0.0013	0.0022	-0.0008	0.0019	-0.0008	-0.0015	0.09
	0.184	*0.844*	*0.785*	*0.807*	*0.006*	*0.077*	*0.693*	*0.139*	*0.054*	*0.397*	*0.068*	*0.359*	*0.200*	

Table 4b
Vector Error-Correction Model Estimates: Price Equation 2

This table presents results from the second equation of the VECM estimates from a four endogenous variable system: ln(NAV) (*N*), log price *(P)*, net weekly flows *(F)*, and net institutional weekly closed-end fund flows from the TAQ database *(T)*. The funds are matched to the flows by the country in which the funds specialize. The number of lags is set to three weeks. Each equation of the system is estimated separately, stacked across each regional group. Coefficients are restricted to be the same across all members of each group, though idiosyncratic intercepts are permitted. The system is estimated using OLS, with standard errors corrected for within fund heteroskedasticity and autocorrelation, and within region cross-fund contemporaneous correlation in the residuals. FX rates for conversion are obtained from WMR/Reuters using Datastream. SP represents returns on the S&P 500 index – contemporaneous and three weekly lags are included, though we do not report these coefficients. We report R^2 (degrees of freedom) in the final column. All data covers the period from August 5, 1994 to December 31, 1998. A complete list of funds, countries and regions is provided in the Appendix.

$$\Delta P_{it} = r_a + r_D[D_{it-1}] + r_{N1}\Delta N_{it-1} + r_{N2}\Delta N_{it-2} + r_{N3}\Delta N_{it-3} + r_{P1}\Delta P_{it-1} + r_{P2}\Delta P_{it-2} + r_{P3}\Delta P_{it-3}$$
$$+ r_{F1}F_{it-1} + r_{F2}F_{it-2} + r_{F3}F_{it-3} + r_{T1}T_{it-1} + r_{T2}T_{it-2} + r_{T3}T_{it-3} + r_{SP}SP_t + r_{SP1}SP_{t-1} + r_{SP2}SP_{t-2} + r_{SP3}SP_{t-3} + e_P$$

(p-values below coefficients)

Region	r_D	r_{N1}	r_{N2}	r_{N3}	r_{P1}	r_{P2}	r_{P3}	r_{F1}	r_{F2}	r_{F3}	r_{T1}	r_{T2}	r_{T3}	R^2 (8780)
All	0.0183	0.1383	0.0733	0.0233	-0.2075	-0.0187	-0.0335	0.0008	0.0008	-0.0003	0.0002	-0.0004	0.0001	0.15
	0.061	*0.004*	*0.099*	*0.489*	*0.000*	*0.547*	*0.194*	*0.065*	*0.069*	*0.452*	*0.503*	*0.147*	*0.737*	
Developed	0.0685	0.1369	0.1359	0.0839	-0.1762	-0.0586	-0.1118	0.0005	0.0001	0.0003	-0.0003	-0.0005	0.0006	0.22
	0.000	*0.010*	*0.011*	*0.081*	*0.000*	*0.171*	*0.001*	*0.254*	*0.881*	*0.393*	*0.447*	*0.132*	*0.033*	
Emerging	0.0161	0.1359	0.0647	0.0142	-0.2100	-0.0117	-0.0188	0.0008	0.0010	-0.0006	0.0004	-0.0004	-0.0001	0.14
	0.112	*0.011*	*0.183*	*0.701*	*0.000*	*0.737*	*0.517*	*0.122*	*0.064*	*0.365*	*0.306*	*0.335*	*0.823*	
Latin America	0.0232	0.2064	0.2236	0.1241	-0.2857	-0.1385	-0.0968	0.0008	0.0014	0.0007	0.0012	-0.0008	-0.0004	0.18
	0.379	*0.045*	*0.009*	*0.238*	*0.000*	*0.102*	*0.260*	*0.302*	*0.054*	*0.270*	*0.066*	*0.308*	*0.452*	
Emerging East Asia	0.0166	0.1033	0.0270	-0.0028	-0.2081	0.0219	-0.0082	0.0010	0.0015	-0.0025	0.0003	0.0003	0.0002	0.16
	0.196	*0.149*	*0.684*	*0.954*	*0.001*	*0.626*	*0.825*	*0.309*	*0.190*	*0.020*	*0.649*	*0.606*	*0.762*	
Emerging Europe	0.0079	0.2436	0.2102	0.0584	-0.3013	-0.1453	-0.0652	0.0003	0.0004	0.0001	-0.0002	-0.0006	0.0000	0.15
	0.686	*0.000*	*0.002*	*0.425*	*0.001*	*0.022*	*0.326*	*0.497*	*0.231*	*0.907*	*0.672*	*0.463*	*0.929*	
Other Emerging	0.0121	0.2351	0.0590	0.0026	-0.1764	-0.0452	-0.0546	0.0009	0.0007	0.0015	0.0014	-0.0017	-0.0003	0.10
	0.417	*0.000*	*0.305*	*0.964*	*0.001*	*0.255*	*0.195*	*0.390*	*0.697*	*0.242*	*0.255*	*0.102*	*0.827*	

Table 4c
Vector Error-Correction Model Estimates: Flows Equation 3

This table presents results from the third equation of the VECM estimates from a four endogenous variable system: ln(NAV) (*N*), log price *(P)*, net weekly flows *(F)*, and net institutional weekly closed-end fund flows from the TAQ database *(T)*. The funds are matched to the flows by the country in which the funds specialize. The number of lags is set to three weeks. Each equation of the system is estimated separately, stacked across each regional group. Coefficients are restricted to be the same across all members of each group, though idiosyncratic intercepts are permitted. The system is estimated using OLS, with standard errors corrected for within fund heteroskedasticity and autocorrelation, and within region cross-fund contemporaneous correlation in the residuals. FX rates for conversion are obtained from WMR/Reuters using Datastream. SP represents returns on the S&P 500 index – contemporaneous and three weekly lags are included, though we do not report these coefficients. We report R^2 (degrees of freedom) in the final column. All data covers the period from August 5, 1994 to December 31, 1998. A complete list of funds, countries and regions is provided in the Appendix.

$$F_{it} = f_a + f_D[D_{it-1}] + f_{N1}\Delta N_{it-1} + f_{N2}\Delta N_{it-2} + f_{N3}\Delta N_{it-3} + f_{P1}\Delta P_{it-1} + f_{P2}\Delta P_{it-2} + f_{P3}\Delta P_{it-3}$$
$$+ f_{F1}F_{it-1} + f_{F2}F_{it-2} + f_{F3}F_{it-3} + f_{T1}T_{it-1} + f_{T2}T_{it-2} + f_{T3}T_{it-3} + f_{SP}SP_t + f_{SP1}SP_{t-1} + f_{SP2}SP_{t-2} + f_{SP3}SP_{t-3} + e_F$$

(p-values below coefficients)

Region	f_D	f_{N1}	f_{N2}	f_{N3}	f_{P1}	f_{P2}	f_{P3}	f_{F1}	f_{F2}	f_{F3}	f_{T1}	f_{T2}	f_{T3}	R^2 (8780)
All	-0.6434	1.5838	-0.5637	-2.2617	1.6087	1.1303	2.1530	0.1636	0.1142	0.0764	0.0357	-0.0010	-0.0086	0.10
	0.015	*0.225*	*0.774*	*0.100*	*0.161*	*0.329*	*0.063*	*0.000*	*0.000*	*0.000*	*0.034*	*0.949*	*0.624*	
Developed	-0.3169	6.5803	3.6224	-4.0790	0.6173	-0.5034	2.8975	0.2347	0.0674	0.0933	-0.0574	-0.0072	0.0290	0.12
	0.602	*0.000*	*0.119*	*0.096*	*0.662*	*0.767*	*0.128*	*0.000*	*0.098*	*0.003*	*0.036*	*0.767*	*0.240*	
Emerging	-0.6498	0.9992	-0.9928	-1.9275	1.6959	1.3383	2.0402	0.1360	0.1293	0.0709	0.0707	0.0068	-0.0204	0.11
	0.020	*0.495*	*0.645*	*0.200*	*0.189*	*0.309*	*0.115*	*0.001*	*0.000*	*0.007*	*0.000*	*0.728*	*0.350*	
Latin America	-0.4599	0.8990	-0.7605	-0.6811	1.5326	0.2667	0.0296	0.0212	0.1570	0.0003	0.0715	0.0090	-0.0070	0.10
	0.437	*0.757*	*0.691*	*0.691*	*0.457*	*0.889*	*0.988*	*0.607*	*0.002*	*0.992*	*0.028*	*0.773*	*0.738*	
Emerging East Asia	-0.4794	0.5838	-1.4475	-2.7611	3.3527	2.5652	3.6089	0.2873	0.0525	0.1016	0.0293	-0.0277	-0.0299	0.18
	0.167	*0.755*	*0.637*	*0.206*	*0.076*	*0.166*	*0.059*	*0.000*	*0.341*	*0.013*	*0.147*	*0.279*	*0.112*	
Emerging Europe	-1.4413	-0.3043	-0.9879	-0.7833	-2.9744	-2.3769	-3.8057	0.0017	0.1027	0.1071	0.1712	0.0596	0.0019	0.06
	0.089	*0.923*	*0.736*	*0.819*	*0.394*	*0.532*	*0.244*	*0.986*	*0.013*	*0.078*	*0.006*	*0.301*	*0.980*	
Other Emerging	-1.1050	2.6114	1.0162	0.3418	0.1690	-0.7967	0.8144	0.1316	0.1389	0.1519	0.0343	0.0814	-0.0382	0.18
	0.000	*0.033*	*0.476*	*0.729*	*0.818*	*0.329*	*0.364*	*0.006*	*0.000*	*0.000*	*0.285*	*0.141*	*0.653*	

Table 4d
Vector Error-Correction Model Estimates: Institutional Investor TAQ Flows Equation 4

This table presents results from the fourth equation of the VECM estimates from a four endogenous variable system: ln(NAV) (*N*), log price *(P)*, net weekly flows *(F)*, and net institutional weekly closed-end fund flows from the TAQ database *(T)*. The funds are matched to the flows by the country in which the funds specialize. The number of lags is set to three weeks. Each equation of the system is estimated separately, stacked across each regional group. Coefficients are restricted to be the same across all members of each group, though idiosyncratic intercepts are permitted. The system is estimated using OLS, with standard errors corrected for within fund heteroskedasticity and autocorrelation, and within region cross-fund contemporaneous correlation in the residuals. FX rates for conversion are obtained from WMR/Reuters using Datastream. SP represents returns on the S&P 500 index – contemporaneous and three weekly lags are included, though we do not report these coefficients. We report R^2 (degrees of freedom) in the final column. All data covers the period from August 5, 1994 to December 31, 1998. A complete list of funds, countries and regions is provided in the Appendix.

$$T_{it} = t_a + t_D[D_{it-1}] + t_{N1}\Delta N_{it-1} + t_{N2}\Delta N_{it-2} + t_{N3}\Delta N_{it-3} + t_{P1}\Delta P_{it-1} + t_{P2}\Delta P_{it-2} + t_{P3}\Delta P_{it-3}$$
$$+ t_{F1}F_{it-1} + t_{F2}F_{it-2} + t_{F3}F_{it-3} + t_{T1}T_{it-1} + t_{T2}T_{it-2} + t_{T3}T_{it-3} + t_{SP}SP_t + t_{SP1}SP_{t-1} + t_{SP2}SP_{t-2} + t_{SP3}SP_{t-3} + e_T$$

(p-values below coefficients)

Region	t_D	t_{N1}	t_{N2}	t_{N3}	t_{P1}	t_{P2}	t_{P3}	t_{F1}	t_{F2}	t_{F3}	t_{T1}	t_{T2}	t_{T3}	R^2 (8780)
All	-0.2891	0.0879	0.0852	0.2227	0.5638	-0.2964	-0.7244	0.0033	0.0141	0.0011	0.0248	0.0082	0.0217	0.01
	0.113	*0.931*	*0.932*	*0.773*	*0.414*	*0.695*	*0.428*	*0.835*	*0.161*	*0.952*	*0.203*	*0.613*	*0.166*	
Developed	1.2794	3.4219	4.8726	3.9164	-0.0108	-2.1493	-5.3878	-0.0058	0.0079	-0.0212	0.0169	0.0346	0.0300	0.01
	0.183	*0.078*	*0.090*	*0.297*	*0.990*	*0.053*	*0.227*	*0.752*	*0.563*	*0.253*	*0.379*	*0.042*	*0.302*	
Emerging	-0.3546	-0.3626	-0.4520	-0.3475	0.7242	0.0611	0.0889	0.0049	0.0168	0.0102	0.0266	0.0001	0.0202	0.01
	0.055	*0.739*	*0.671*	*0.598*	*0.358*	*0.943*	*0.900*	*0.807*	*0.194*	*0.649*	*0.308*	*0.996*	*0.308*	
Latin America	-1.8479	-2.2436	4.3115	-0.6290	-1.0800	-4.2389	-2.6859	0.0173	0.0050	0.0218	-0.0557	-0.0243	-0.0346	0.03
	0.000	*0.526*	*0.106*	*0.705*	*0.702*	*0.096*	*0.220*	*0.446*	*0.854*	*0.598*	*0.448*	*0.385*	*0.338*	
Emerging East Asia	0.0184	0.1578	-1.0958	0.0942	1.6364	0.0505	0.3767	0.0312	0.0314	-0.0277	0.0727	0.0445	0.0296	0.02
	0.930	*0.906*	*0.453*	*0.909*	*0.103*	*0.966*	*0.688*	*0.306*	*0.198*	*0.196*	*0.003*	*0.099*	*0.158*	
Emerging Europe	-1.1767	-2.6772	-0.8983	-1.4877	4.8612	4.0244	-0.4292	-0.0672	-0.0084	0.0632	0.0203	-0.0519	0.0606	-0.01
	0.302	*0.346*	*0.513*	*0.308*	*0.320*	*0.282*	*0.641*	*0.318*	*0.340*	*0.346*	*0.379*	*0.363*	*0.337*	
Other Emerging	-0.6728	-0.5675	-0.2311	-0.4473	-0.6140	0.6981	0.6840	0.0336	0.0742	-0.0262	0.0593	0.0341	0.0359	0.03
	0.001	*0.731*	*0.849*	*0.719*	*0.447*	*0.335*	*0.343*	*0.364*	*0.107*	*0.526*	*0.431*	*0.569*	*0.472*	

Table 5a
Vector Error-Correction Model Estimates: Discount Equation 1

This table presents results from the first equation of the vector error correction model estimates from a three endogenous variable system: closed-end fund discounts: ln(NAV/price) (*D*), net weekly flows *(F)*, and net individual investor weekly flows into closed-end funds from the TAQ database (I). The funds are matched to the flows by the country in which the funds specialize. The number of lags is set to three weeks. Each equation of the system is estimated separately, stacked across each regional group. Coefficients are restricted to be the same across all members of each group, though idiosyncratic intercepts are permitted. The system is estimated using OLS, with standard errors corrected for within fund heteroskedasticity and autocorrelation, and within region cross-fund contemporaneous correlation in the residuals. FX rates for conversion are obtained from WMR/Reuters using Datastream. SP represents returns on the S&P 500 index – contemporaneous and three weekly lags are included, though we do not report these coefficients. We report R^2 (degrees of freedom) in the final column. All data covers the period from August 5, 1994 to December 31, 1998. A complete list of funds, countries and regions is provided in the Appendix.

$$\Delta D_{it} = d_a + d_D[D_{it-1}] + d_{D1}\Delta D_{it-1} + d_{D2}\Delta D_{it-2} + d_{D3}\Delta D_{it-3} + d_{F1}F_{it-1} + d_{F2}F_{it-2} + d_{F3}F_{it-3}$$
$$+ d_{I1}I_{it-1} + d_{I2}I_{it-2} + d_{I3}I_{it-3} + d_{SP}SP_t + d_{SP1}SP_{t-1} + d_{SP2}SP_{t-2} + d_{SP3}SP_{t-3} + e_D$$

(p-values below coefficients)

Region	d_D	d_{D1}	d_{D2}	d_{D3}	d_{F1}	d_{F2}	d_{F3}	d_{I1}	d_{I2}	d_{I3}	R^2 (8783)
All	-0.0320	-0.2059	-0.0563	-0.0178	0.0006	0.0001	-0.0003	-0.0004	0.0002	0.0008	0.08
	0.000	*0.000*	*0.029*	*0.357*	*0.056*	*0.764*	*0.362*	*0.376*	*0.728*	*0.030*	
Developed	-0.0983	-0.2430	-0.0833	-0.0611	-0.0001	-0.0001	-0.0003	-0.0009	-0.0002	0.0005	0.15
	0.000	*0.000*	*0.027*	*0.035*	*0.727*	*0.855*	*0.312*	*0.003*	*0.569*	*0.143*	
Emerging	-0.0287	-0.1970	-0.0501	-0.0089	0.0008	0.0002	-0.0004	-0.0002	0.0002	0.0008	0.07
	0.000	*0.000*	*0.079*	*0.680*	*0.033*	*0.744*	*0.410*	*0.683*	*0.700*	*0.075*	
Latin America	-0.0304	-0.3229	-0.1091	-0.0096	-0.0001	0.0001	-0.0002	-0.0008	0.0002	-0.0002	0.12
	0.020	*0.000*	*0.024*	*0.863*	*0.674*	*0.924*	*0.561*	*0.266*	*0.739*	*0.695*	
Emerging East Asia	-0.0313	-0.1373	-0.0225	-0.0030	0.0018	-0.0005	-0.0002	0.0000	0.0005	0.0017	0.05
	0.000	*0.002*	*0.560*	*0.918*	*0.019*	*0.660*	*0.850*	*0.994*	*0.673*	*0.044*	
Emerging Europe	-0.0351	-0.3742	-0.1828	-0.0262	0.0000	0.0000	0.0000	-0.0006	-0.0004	0.0013	0.16
	0.034	*0.000*	*0.001*	*0.599*	*0.962*	*0.931*	*0.942*	*0.298*	*0.476*	*0.030*	
Other Emerging	-0.0315	-0.2506	-0.0945	-0.0514	0.0006	0.0020	-0.0020	0.0007	-0.0013	0.0005	0.11
	0.018	*0.000*	*0.003*	*0.107*	*0.457*	*0.193*	*0.043*	*0.591*	*0.260*	*0.622*	

Table 5b
Vector Error-Correction Model Estimates: Flows Equation 2

This table presents results from the second equation of the vector error correction model estimates from a three endogenous variable system: closed-end fund discounts: ln(NAV/price) (D), net weekly flows *(F)*, and net individual investor weekly flows into closed-end funds from the TAQ database (I). The funds are matched to the flows by the country in which the funds specialize. The number of lags is set to three weeks. Each equation of the system is estimated separately, stacked across each regional group. Coefficients are restricted to be the same across all members of each group, though idiosyncratic intercepts are permitted. The system is estimated using OLS, with standard errors corrected for within fund heteroskedasticity and autocorrelation, and within region cross-fund contemporaneous correlation in the residuals. FX rates for conversion are obtained from WMR/Reuters using Datastream. SP represents returns on the S&P 500 index – contemporaneous and three weekly lags are included, though we do not report these coefficients. We report R^2 (degrees of freedom) in the final column. All data covers the period from August 5, 1994 to December 31, 1998. A complete list of funds, countries and regions is provided in the Appendix.

$$F_{it} = f_a + f_D[D_{it-1}] + f_{D1}\Delta D_{it-1} + f_{D2}\Delta D_{it-2} + f_{D3}\Delta D_{it-3} + f_{F1}F_{it-1} + f_{F2}F_{it-2} + f_{F3}F_{it-3}$$
$$+ f_{I1}I_{it-1} + f_{I2}I_{it-2} + f_{I3}I_{it-3} + f_{SP}SP_t + f_{SP1}SP_{t-1} + f_{SP2}SP_{t-2} + f_{SP3}SP_{t-3} + e_F$$

(p-values below coefficients)

Region	f_D	f_{D1}	f_{D2}	f_{D3}	f_{F1}	f_{F2}	f_{F3}	f_{I1}	f_{I2}	f_{I3}	R^2 (8783)
All	-0.6668	-0.6221	-0.5971	-1.8532	0.1697	0.1162	0.0761	0.0214	0.0180	0.0173	0.10
	0.012	*0.577*	*0.649*	*0.106*	*0.000*	*0.000*	*0.000*	*0.260*	*0.250*	*0.336*	
Developed	-0.3916	2.0242	1.4999	-3.6107	0.2442	0.0670	0.0956	0.0115	-0.0054	-0.0224	0.11
	0.533	*0.118*	*0.383*	*0.058*	*0.000*	*0.102*	*0.002*	*0.581*	*0.842*	*0.323*	
Emerging	-0.7226	-1.0380	-0.9021	-1.4891	0.1412	0.1286	0.0680	0.0309	0.0285	0.0337	0.10
	0.009	*0.406*	*0.539*	*0.239*	*0.000*	*0.000*	*0.011*	*0.204*	*0.126*	*0.140*	
Latin America	-0.3193	-1.2160	-0.2997	0.5567	0.0277	0.1500	-0.0119	0.0586	0.0031	0.0335	0.10
	0.599	*0.565*	*0.869*	*0.719*	*0.499*	*0.002*	*0.730*	*0.146*	*0.900*	*0.510*	
Emerging East Asia	-0.7218	-1.3951	-0.9119	-2.2271	0.2844	0.0547	0.0954	0.0777	0.0484	0.0277	0.18
	0.058	*0.421*	*0.651*	*0.214*	*0.000*	*0.307*	*0.019*	*0.053*	*0.052*	*0.308*	
Emerging Europe	-1.5543	-1.8392	-2.4680	0.3891	0.0197	0.1009	0.0781	-0.0697	0.0077	0.0465	0.04
	0.074	*0.514*	*0.412*	*0.899*	*0.843*	*0.026*	*0.221*	*0.289*	*0.887*	*0.250*	
Other Emerging	-1.2235	0.1943	0.2438	-0.5152	0.1419	0.1438	0.1672	-0.0169	0.0206	0.0409	0.16
	0.000	*0.786*	*0.782*	*0.440*	*0.007*	*0.000*	*0.000*	*0.654*	*0.450*	*0.446*	

Table 5c
Vector Error-Correction Model Estimates: Individual Investor TAQ Flows Equation 3

This table presents results from the third equation of the vector error correction model estimates from a three endogenous variable system: closed-end fund discounts: ln(NAV/price) (*D*), net weekly flows *(F)*, and net individual investor weekly flows into closed-end funds from the TAQ database (I). The funds are matched to the flows by the country in which the funds specialize. The number of lags is set to three weeks. Each equation of the system is estimated separately, stacked across each regional group. Coefficients are restricted to be the same across all members of each group, though idiosyncratic intercepts are permitted. The system is estimated using OLS, with standard errors corrected for within fund heteroskedasticity and autocorrelation, and within region cross-fund contemporaneous correlation in the residuals. FX rates for conversion are obtained from WMR/Reuters using Datastream. SP represents returns on the S&P 500 index – contemporaneous and three weekly lags are included, though we do not report these coefficients. We report R^2 (degrees of freedom) in the final column. All data covers the period from August 5, 1994 to December 31, 1998. A complete list of funds, countries and regions is provided in the Appendix.

$$I_{it} = i_a + i_D[D_{it-1}] + i_{D1}\Delta D_{it-1} + i_{D2}\Delta D_{it-2} + i_{D3}\Delta D_{it-3} + i_{F1}F_{it-1} + i_{F2}F_{it-2} + i_{F3}F_{it-3}$$
$$+ i_{I1}I_{it-1} + i_{I2}I_{it-2} + i_{I3}I_{it-3} + i_L L_{it} + i_{SP}SP_t + i_{SP1}SP_{t-1} + i_{SP2}SP_{t-2} + i_{SP3}SP_{t-3} + e_I$$

(p-values below coefficients)

Region	i_D	i_{D1}	i_{D2}	i_{D3}	i_{F1}	i_{F2}	i_{F3}	i_{I1}	i_{I2}	i_{I3}	R^2 (8783)
All	-0.0530	0.4475	-0.6372	-1.1355	0.0272	-0.0330	0.0012	0.1307	0.0228	0.0540	0.04
	0.819	*0.360*	*0.457*	*0.414*	*0.151*	*0.174*	*0.933*	*0.013*	*0.008*	*0.054*	
Developed	0.9190	1.2888	-1.2274	-1.0075	0.0553	-0.0238	0.0102	0.0817	0.0340	0.0396	0.01
	0.481	*0.370*	*0.416*	*0.454*	*0.347*	*0.273*	*0.242*	*0.001*	*0.034*	*0.014*	
Emerging	-0.1385	0.3680	-0.4461	-1.0927	0.0152	-0.0388	-0.0037	0.1518	0.0223	0.0637	0.05
	0.555	*0.435*	*0.626*	*0.482*	*0.319*	*0.246*	*0.833*	*0.035*	*0.055*	*0.114*	
Latin America	0.4064	0.3601	0.6838	1.0562	0.0132	-0.0421	0.0034	0.2093	0.0409	0.1345	0.09
	0.494	*0.682*	*0.519*	*0.411*	*0.527*	*0.302*	*0.866*	*0.246*	*0.412*	*0.271*	
Emerging East Asia	-0.0068	0.1245	-0.9812	-1.9419	-0.0011	-0.0816	0.0294	0.1307	0.0147	0.0476	0.04
	0.922	*0.797*	*0.242*	*0.360*	*0.903*	*0.310*	*0.381*	*0.183*	*0.261*	*0.180*	
Emerging Europe	-0.4664	5.3278	5.4669	-1.3534	0.0782	0.0083	-0.0726	0.1300	0.0332	-0.0124	0.02
	0.231	*0.434*	*0.249*	*0.351*	*0.236*	*0.626*	*0.285*	*0.019*	*0.183*	*0.609*	
Other Emerging	-0.2580	0.4979	-0.6672	0.2692	-0.0033	0.0359	-0.0366	0.1242	0.0413	0.0674	0.03
	0.208	*0.350*	*0.358*	*0.349*	*0.760*	*0.327*	*0.327*	*0.266*	*0.217*	*0.305*	

Table 6a
Vector Error-Correction Model Estimates: NAV Equation 1

This table presents results from the first equation of the VECM estimates from a four endogenous variable system: ln(NAV) (*N*), log price *(P)*, net weekly flows *(F)*, and net individual investor weekly closed-end fund flows from the TAQ database (I). The funds are matched to the flows by the country in which the funds specialize. The number of lags is set to three weeks. Each equation of the system is estimated separately, stacked across each regional group. Coefficients are restricted to be the same across all members of each group, though idiosyncratic intercepts are permitted. The system is estimated using OLS, with standard errors corrected for within fund heteroskedasticity and autocorrelation, and within region cross-fund contemporaneous correlation in the residuals. FX rates for conversion are obtained from WMR/Reuters using Datastream. SP represents returns on the S&P 500 index – contemporaneous and three weekly lags are included, though we do not report these coefficients. We report R^2 (degrees of freedom) in the final column. All data covers the period from August 5, 1994 to December 31, 1998. A complete list of funds, countries and regions is provided in the Appendix.

$$\Delta N_{it} = h_a + h_D[D_{it-1}] + h_{N1}\Delta N_{it-1} + h_{N2}\Delta N_{it-2} + h_{N3}\Delta N_{it-3} + h_{P1}\Delta P_{it-1} + h_{P2}\Delta P_{it-2} + h_{P3}\Delta P_{it-3}$$
$$+ h_{F1}F_{it-1} + h_{F2}F_{it-2} + h_{F3}F_{it-3} + h_{I1}I_{it-1} + h_{I2}I_{it-2} + h_{I3}I_{it-3} + h_{SP}SP_t + h_{SP1}SP_{t-1} + h_{SP2}SP_{t-2} + h_{SP3}SP_{t-3} + e_N$$

(*p-values below coefficients)*

Region	h_D	h_{N1}	h_{N2}	h_{N3}	h_{P1}	h_{P2}	h_{P3}	h_{F1}	h_{F2}	h_{F3}	h_{I1}	h_{I2}	h_{I3}	R^2 (8780)
All	-0.0143	-0.0597	0.0602	0.0590	0.0099	0.0603	0.0248	0.0012	0.0007	-0.0009	0.0002	0.0000	-0.0001	0.11
	0.119	*0.108*	*0.197*	*0.154*	*0.792*	*0.054*	*0.445*	*0.006*	*0.109*	*0.026*	*0.692*	*0.966*	*0.730*	
Developed	-0.0274	-0.1413	0.0378	0.0544	0.0354	0.0008	-0.0338	0.0005	0.0000	0.0000	0.0001	-0.0001	0.0001	0.15
	0.024	*0.000*	*0.408*	*0.136*	*0.214*	*0.979*	*0.210*	*0.131*	*0.952*	*0.957*	*0.574*	*0.712*	*0.847*	
Emerging	-0.0133	-0.0527	0.0580	0.0570	0.0070	0.0696	0.0343	0.0015	0.0009	-0.0012	0.0002	0.0000	-0.0002	0.10
	0.159	*0.201*	*0.256*	*0.208*	*0.868*	*0.050*	*0.348*	*0.010*	*0.093*	*0.025*	*0.779*	*0.959*	*0.662*	
Latin America	-0.0045	-0.0461	0.1068	0.1342	0.0713	-0.0241	-0.0842	0.0005	0.0012	0.0001	0.0002	-0.0005	0.0003	0.14
	0.857	*0.615*	*0.214*	*0.176*	*0.310*	*0.768*	*0.368*	*0.469*	*0.054*	*0.778*	*0.776*	*0.483*	*0.617*	
Emerging East Asia	-0.0136	-0.0486	0.0725	0.0632	-0.0599	0.0999	0.0832	0.0026	0.0007	-0.0030	0.0005	0.0004	-0.0006	0.15
	0.286	*0.361*	*0.297*	*0.265*	*0.324*	*0.035*	*0.076*	*0.016*	*0.576*	*0.003*	*0.680*	*0.745*	*0.431*	
Emerging Europe	-0.0295	-0.1154	0.0507	0.0189	0.0618	0.0178	-0.0521	0.0002	0.0004	0.0001	-0.0002	-0.0002	0.0003	0.05
	0.204	*0.198*	*0.499*	*0.802*	*0.587*	*0.809*	*0.456*	*0.658*	*0.377*	*0.762*	*0.727*	*0.758*	*0.493*	
Other Emerging	-0.0177	0.0014	0.0062	0.0162	0.1055	0.0472	0.0121	0.0011	0.0021	-0.0005	-0.0004	0.0013	-0.0023	0.09
	0.145	*0.972*	*0.888*	*0.683*	*0.001*	*0.111*	*0.699*	*0.181*	*0.075*	*0.593*	*0.783*	*0.225*	*0.039*	

Table 6b
Vector Error-Correction Model Estimates: Price Equation 2

This table presents results from the second equation of the VECM estimates from a four endogenous variable system: ln(NAV) (*N*), log price *(P)*, net weekly flows *(F)*, and net individual investor weekly closed-end fund flows from the TAQ database (I). The funds are matched to the flows by the country in which the funds specialize. The number of lags is set to three weeks. Each equation of the system is estimated separately, stacked across each regional group. Coefficients are restricted to be the same across all members of each group, though idiosyncratic intercepts are permitted. The system is estimated using OLS, with standard errors corrected for within fund heteroskedasticity and autocorrelation, and within region cross-fund contemporaneous correlation in the residuals. FX rates for conversion are obtained from WMR/Reuters using Datastream. SP represents returns on the S&P 500 index – contemporaneous and three weekly lags are included, though we do not report these coefficients. We report R^2 (degrees of freedom) in the final column. All data covers the period from August 5, 1994 to December 31, 1998. A complete list of funds, countries and regions is provided in the Appendix.

$$\Delta P_{it} = r_a + r_D[D_{it-1}] + r_{N1}\Delta N_{it-1} + r_{N2}\Delta N_{it-2} + r_{N3}\Delta N_{it-3} + r_{P1}\Delta P_{it-1} + r_{P2}\Delta P_{it-2} + r_{P3}\Delta P_{it-3}$$
$$+ r_{F1}F_{it-1} + r_{F2}F_{it-2} + r_{F3}F_{it-3} + r_{I1}I_{it-1} + r_{I2}I_{it-2} + r_{I3}I_{it-3} + r_{SP}SP_t + r_{SP1}SP_{t-1} + r_{SP2}SP_{t-2} + r_{SP3}SP_{t-3} + e_P$$

(p-values below coefficients)

Region	r_D	r_{N1}	r_{N2}	r_{N3}	r_{P1}	r_{P2}	r_{P3}	r_{F1}	r_{F2}	r_{F3}	r_{I1}	r_{I2}	r_{I3}	R^2 (8780)
All	0.0182	0.1404	0.0784	0.0242	-0.2111	-0.0266	-0.0312	0.0008	0.0008	-0.0004	0.0006	-0.0001	-0.0007	0.15
	0.063	*0.002*	*0.072*	*0.475*	*0.000*	*0.387*	*0.230*	*0.052*	*0.068*	*0.411*	*0.344*	*0.921*	*0.093*	
Developed	0.0708	0.1457	0.1409	0.0808	-0.1923	-0.0738	-0.1057	0.0006	0.0000	0.0003	0.0009	0.0001	-0.0004	0.22
	0.000	*0.006*	*0.008*	*0.091*	*0.000*	*0.088*	*0.002*	*0.191*	*0.937*	*0.340*	*0.003*	*0.831*	*0.342*	
Emerging	0.0160	0.1367	0.0682	0.0146	-0.2101	-0.0170	-0.0166	0.0009	0.0010	-0.0006	0.0004	-0.0001	-0.0008	0.14
	0.114	*0.007*	*0.149*	*0.695*	*0.000*	*0.621*	*0.572*	*0.096*	*0.060*	*0.352*	*0.576*	*0.884*	*0.136*	
Latin America	0.0269	0.2054	0.2209	0.1295	-0.2771	-0.1418	-0.1072	0.0008	0.0013	0.0006	0.0010	-0.0008	0.0005	0.18
	0.293	*0.035*	*0.011*	*0.224*	*0.000*	*0.098*	*0.212*	*0.307*	*0.087*	*0.383*	*0.275*	*0.455*	*0.582*	
Emerging East Asia	0.0186	0.1040	0.0294	-0.0014	-0.2075	0.0221	0.0021	0.0012	0.0017	-0.0025	0.0003	0.0001	-0.0019	0.17
	0.148	*0.122*	*0.635*	*0.976*	*0.000*	*0.601*	*0.955*	*0.194*	*0.149*	*0.020*	*0.834*	*0.941*	*0.063*	
Emerging Europe	0.0055	0.2550	0.2293	0.0614	-0.3192	-0.1751	-0.0650	0.0002	0.0004	0.0001	0.0004	0.0002	-0.0010	0.15
	0.793	*0.000*	*0.001*	*0.406*	*0.001*	*0.005*	*0.333*	*0.618*	*0.323*	*0.876*	*0.608*	*0.771*	*0.055*	
Other Emerging	0.0126	0.2279	0.0563	0.0084	-0.1597	-0.0622	-0.0521	0.0009	0.0005	0.0018	-0.0007	0.0029	-0.0025	0.10
	0.390	*0.000*	*0.327*	*0.879*	*0.001*	*0.113*	*0.225*	*0.395*	*0.763*	*0.177*	*0.609*	*0.040*	*0.018*	

Table 6c
Vector Error-Correction Model Estimates: Flows Equation 3

This table presents results from the third equation of the VECM estimates from a four endogenous variable system: ln(NAV) (*N*), log price *(P)*, net weekly flows *(F)*, and net individual investor weekly closed-end fund flows from the TAQ database (I). The funds are matched to the flows by the country in which the funds specialize. The number of lags is set to three weeks. Each equation of the system is estimated separately, stacked across each regional group. Coefficients are restricted to be the same across all members of each group, though idiosyncratic intercepts are permitted. The system is estimated using OLS, with standard errors corrected for within fund heteroskedasticity and autocorrelation, and within region cross-fund contemporaneous correlation in the residuals. FX rates for conversion are obtained from WMR/Reuters using Datastream. SP represents returns on the S&P 500 index – contemporaneous and three weekly lags are included, though we do not report these coefficients. We report R^2 (degrees of freedom) in the final column. All data covers the period from August 5, 1994 to December 31, 1998. A complete list of funds, countries and regions is provided in the Appendix.

$$F_{it} = f_a + f_D[D_{it-1}] + f_{N1}\Delta N_{it-1} + f_{N2}\Delta N_{it-2} + f_{N3}\Delta N_{it-3} + f_{P1}\Delta P_{it-1} + f_{P2}\Delta P_{it-2} + f_{P3}\Delta P_{it-3}$$
$$+ f_{F1}F_{it-1} + f_{F2}F_{it-2} + f_{F3}F_{it-3} + f_{I1}I_{it-1} + f_{I2}I_{it-2} + f_{I3}I_{it-3} + f_{SP}SP_t + f_{SP1}SP_{t-1} + f_{SP2}SP_{t-2} + f_{SP3}SP_{t-3} + e_F$$

(p-values below coefficients)

Region	f_D	f_{N1}	f_{N2}	f_{N3}	f_{P1}	f_{P2}	f_{P3}	f_{F1}	f_{F2}	f_{F3}	f_{I1}	f_{I2}	f_{I3}	R^2 (8780)
All	-0.6632	1.4983	-0.4958	-2.0799	1.9136	1.0001	1.8014	0.1634	0.1136	0.0743	0.0133	0.0193	0.0195	0.10
	0.010	*0.241*	*0.796*	*0.123*	*0.088*	*0.357*	*0.097*	*0.000*	*0.000*	*0.001*	*0.461*	*0.200*	*0.262*	
Developed	-0.3697	7.0855	3.6644	-4.3237	-0.3455	-0.7953	3.4730	0.2338	0.0637	0.0953	0.0036	-0.0068	-0.0187	0.11
	0.556	*0.000*	*0.118*	*0.078*	*0.811*	*0.641*	*0.068*	*0.000*	*0.121*	*0.002*	*0.871*	*0.800*	*0.411*	
Emerging	-0.7208	0.8807	-0.9166	-1.6329	2.3023	1.2736	1.4573	0.1348	0.1257	0.0659	0.0220	0.0307	0.0356	0.11
	0.008	*0.534*	*0.662*	*0.263*	*0.065*	*0.296*	*0.223*	*0.001*	*0.000*	*0.014*	*0.334*	*0.086*	*0.106*	
Latin America	-0.3274	1.0877	-0.5800	-0.1624	1.8957	0.1047	-0.6583	0.0221	0.1505	-0.0123	0.0568	0.0018	0.0362	0.10
	0.588	*0.722*	*0.771*	*0.924*	*0.381*	*0.960*	*0.703*	*0.590*	*0.003*	*0.733*	*0.140*	*0.943*	*0.473*	
Emerging East Asia	-0.7148	0.5999	-0.9699	-2.0457	3.2267	1.6266	2.4337	0.2777	0.0485	0.0940	0.0615	0.0535	0.0280	0.19
	0.051	*0.739*	*0.737*	*0.314*	*0.083*	*0.309*	*0.137*	*0.000*	*0.375*	*0.020*	*0.089*	*0.021*	*0.266*	
Emerging Europe	-1.5222	-2.2774	-3.1034	-1.1241	0.9558	0.9316	-2.9951	0.0202	0.1041	0.0860	-0.0652	0.0142	0.0469	0.03
	0.080	*0.461*	*0.307*	*0.749*	*0.796*	*0.808*	*0.353*	*0.841*	*0.025*	*0.181*	*0.337*	*0.791*	*0.247*	
Other Emerging	-1.1855	2.7047	0.6772	0.2612	0.4782	-0.2340	0.6005	0.1325	0.1356	0.1592	-0.0357	0.0233	0.0344	0.17
	0.000	*0.029*	*0.625*	*0.792*	*0.491*	*0.778*	*0.356*	*0.014*	*0.000*	*0.000*	*0.367*	*0.404*	*0.528*	

Table 6d
Vector Error-Correction Model Estimates: Individual Investor TAQ Flows Equation 4

This table presents results from the fourth equation of the VECM estimates from a four endogenous variable system: ln(NAV) (*N*), log price *(P)*, net weekly flows *(F)*, and net individual investor weekly closed-end fund flows from the TAQ database (I). The funds are matched to the flows by the country in which the funds specialize. The number of lags is set to three weeks. Each equation of the system is estimated separately, stacked across each regional group. Coefficients are restricted to be the same across all members of each group, though idiosyncratic intercepts are permitted. The system is estimated using OLS, with standard errors corrected for within fund heteroskedasticity and autocorrelation, and within region cross-fund contemporaneous correlation in the residuals. FX rates for conversion are obtained from WMR/Reuters using Datastream. SP represents returns on the S&P 500 index – contemporaneous and three weekly lags are included, though we do not report these coefficients. We report R^2 (degrees of freedom) in the final column. All data covers the period from August 5, 1994 to December 31, 1998. A complete list of funds, countries and regions is provided in the Appendix.

$$I_{it} = i_a + i_D[D_{it-1}] + i_{N1}\Delta N_{it-1} + i_{N2}\Delta N_{it-2} + i_{N3}\Delta N_{it-3} + i_{P1}\Delta P_{it-1} + i_{P2}\Delta P_{it-2} + i_{P3}\Delta P_{it-3}$$
$$+ i_{F1}F_{it-1} + i_{F2}F_{it-2} + i_{F3}F_{it-3} + i_{I1}I_{it-1} + i_{I2}I_{it-2} + i_{I3}I_{it-3} + i_{SP}SP_t + i_{SP1}SP_{t-1} + i_{SP2}SP_{t-2} + i_{SP3}SP_{t-3} + e_I$$

(p-values below coefficients)

Region	i_D	i_{N1}	i_{N2}	i_{N3}	i_{P1}	i_{P2}	i_{P3}	i_{F1}	i_{F2}	i_{F3}	i_{I1}	i_{I2}	i_{I3}	R^2 (8780)
All	-0.0551	0.8475	-1.7844	-0.4908	-0.1952	0.0342	1.3400	0.0285	-0.0321	0.0008	0.1280	0.0283	0.0511	0.04
	0.817	*0.223*	*0.338*	*0.761*	*0.756*	*0.928*	*0.272*	*0.134*	*0.160*	*0.954*	*0.011*	*0.004*	*0.050*	
Developed	0.9008	-0.1597	-2.6153	-1.4979	-1.6991	0.8232	0.8399	0.0595	-0.0211	0.0114	0.0840	0.0355	0.0391	0.01
	0.485	*0.765*	*0.287*	*0.333*	*0.377*	*0.504*	*0.503*	*0.341*	*0.289*	*0.221*	*0.002*	*0.021*	*0.011*	
Emerging	-0.1406	0.8934	-1.5643	-0.3704	0.0026	-0.1298	1.3458	0.0163	-0.0383	-0.0045	0.1475	0.0293	0.0600	0.05
	0.562	*0.270*	*0.425*	*0.835*	*0.996*	*0.761*	*0.310*	*0.256*	*0.228*	*0.804*	*0.034*	*0.039*	*0.113*	
Latin America	0.3440	1.4417	0.0898	4.1293	0.1173	0.2100	0.3871	0.0094	-0.0511	-0.0124	0.2062	0.0450	0.1325	0.09
	0.535	*0.423*	*0.931*	*0.312*	*0.894*	*0.828*	*0.678*	*0.593*	*0.294*	*0.552*	*0.242*	*0.405*	*0.267*	
Emerging East Asia	-0.0003	0.7251	-2.7000	-1.7293	0.4195	-0.2879	1.5181	0.0061	-0.0808	0.0335	0.1216	0.0299	0.0431	0.05
	0.997	*0.542*	*0.272*	*0.388*	*0.482*	*0.613*	*0.369*	*0.543*	*0.306*	*0.364*	*0.168*	*0.187*	*0.175*	
Emerging Europe	-0.4801	6.1723	4.9117	-0.6740	-4.0478	-5.4731	2.4257	0.0756	0.0090	-0.0762	0.1261	0.0341	-0.0134	0.01
	0.245	*0.389*	*0.274*	*0.518*	*0.519*	*0.250*	*0.358*	*0.245*	*0.608*	*0.290*	*0.020*	*0.166*	*0.600*	
Other Emerging	-0.2708	-0.2873	-1.5449	0.3934	-0.7249	0.5115	-0.1621	0.0030	0.0382	-0.0342	0.1306	0.0447	0.0657	0.03
	0.216	*0.502*	*0.301*	*0.408*	*0.321*	*0.397*	*0.474*	*0.791*	*0.319*	*0.334*	*0.263*	*0.225*	*0.303*	

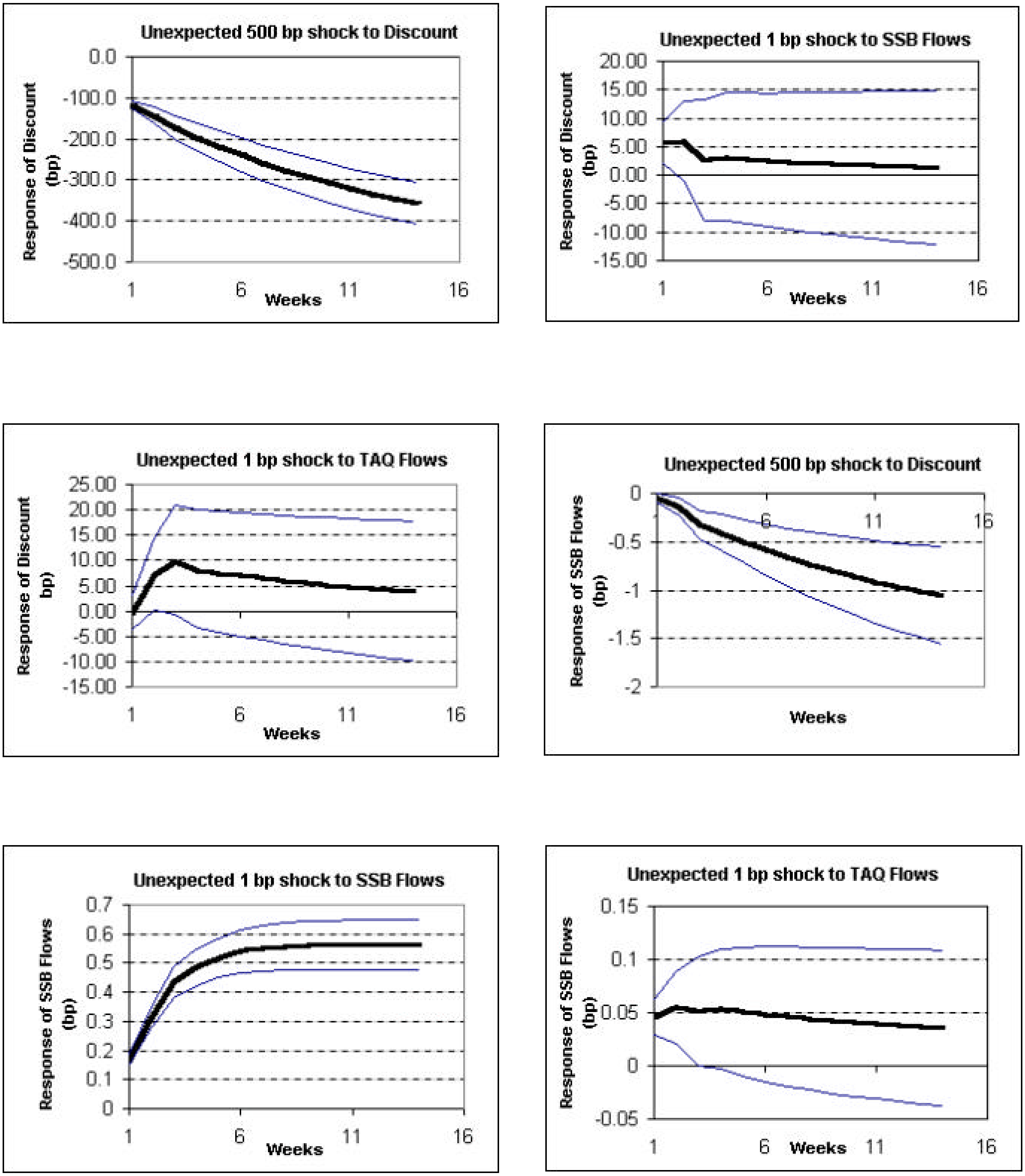

Fig. 1. Impulse response functions: all funds. The cumulative impulse response functions for Discounts and SSB Flows are shown here, and those for the Institutional Investor TAQ Flows on the next page. Parameters are from the VECM as reported in Tables 3a, 3b and 3c. Each impulse response function is derived by generating an innovation to one of the endogenous variables in the system, while holding the others fixed. The impact of the innovations on the cointegrating vector is kept track of following every period in which the system is shocked. The IRF's are shown with 90% confidence intervals, which are obtained by Monte Carlo simulation. Parameter values are drawn from the asymptotic joint distribution of parameters, and a simulated IRF is computed. The procedure is repeated 1000 times.

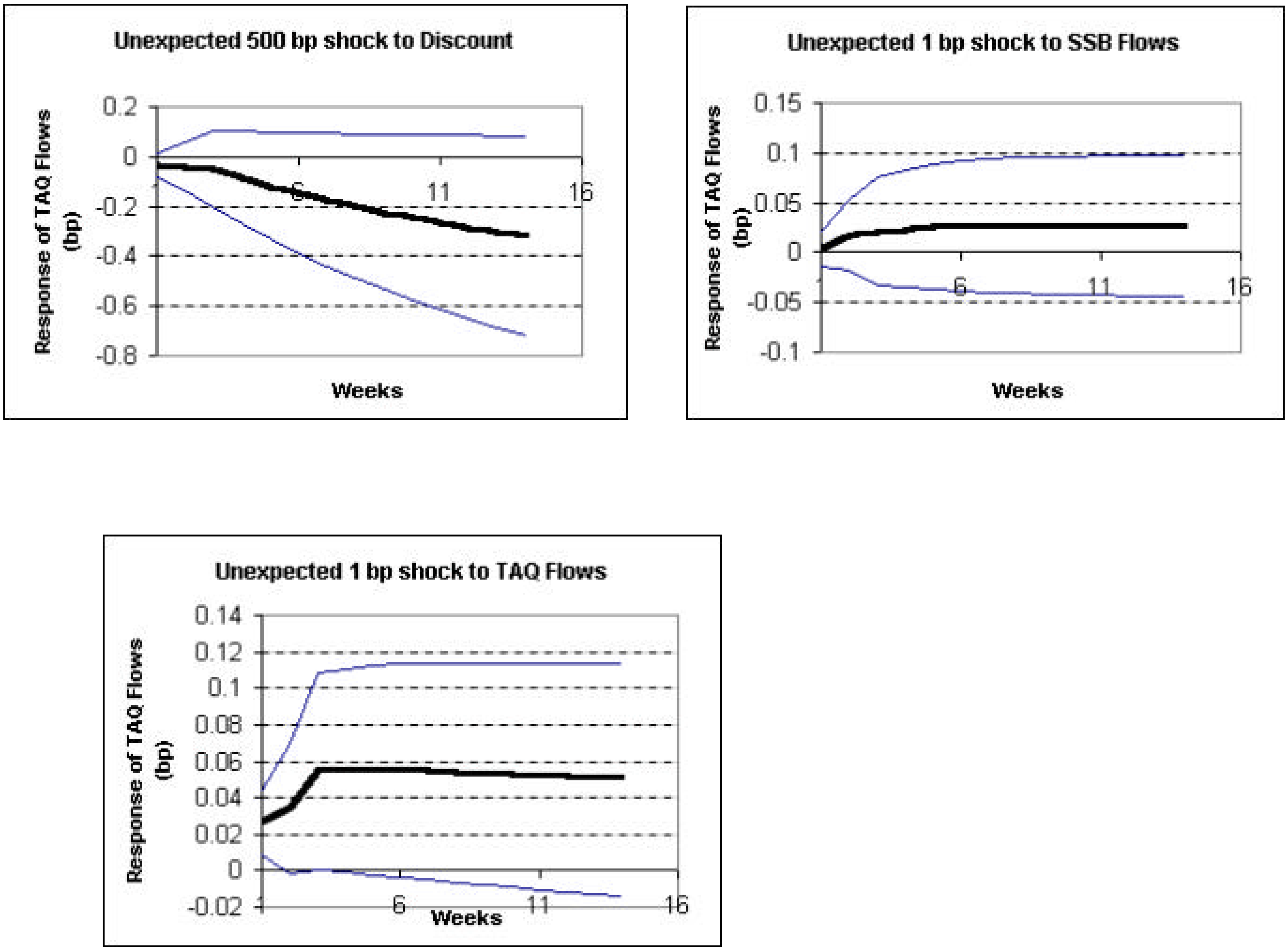

Fig. 1. (continued) Impulse response functions: all funds. The cumulative impulse response functions for the Institutional Investor TAQ Flows are shown here. Parameters are from the VECM as reported in Tables 3a, 3b and 3c. Each impulse response function is derived by generating an innovation to one of the endogenous variables in the system, while holding the others fixed. The impact of the innovations on the cointegrating vector is kept track of following every period in which the system is shocked. The IRF's are shown with 90% confidence intervals, which are obtained by Monte Carlo simulation. Parameter values are drawn from the asymptotic joint distribution of parameters, and a simulated IRF is computed. The procedure is repeated 1000 times.

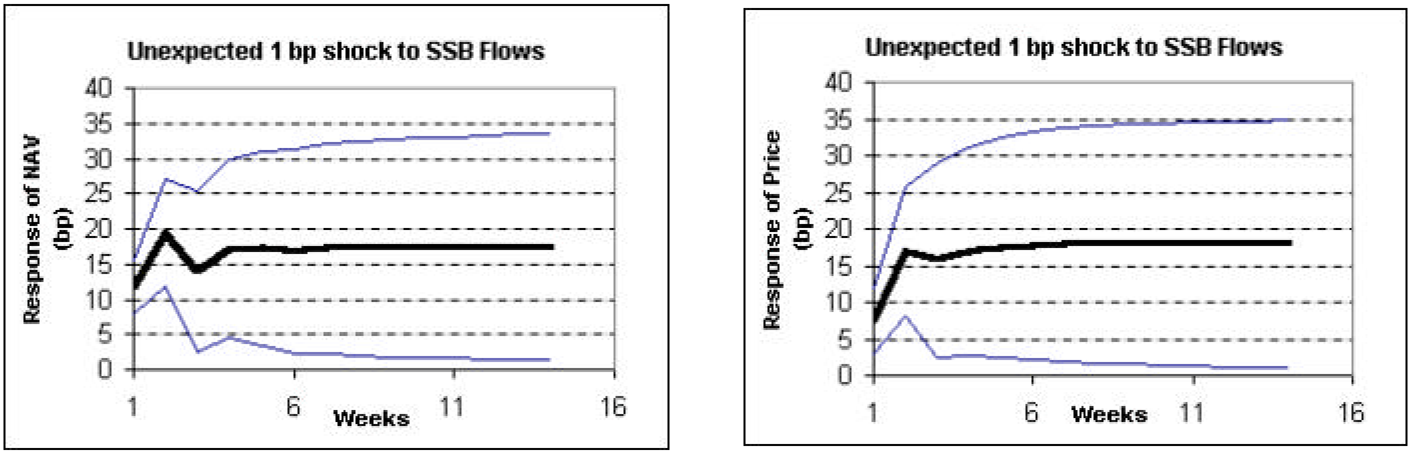

Fig. 2. Impulse response functions: all funds. The cumulative impulse response functions for the NAV and Price to SSB Flow innovations are shown here. Parameters are from the VECM as reported in Tables 4a and 4b. Each impulse response function is derived by generating an innovation to one of the endogenous variables in the system, while holding the others fixed. The impact of the innovations on the cointegrating vector is kept track of following every period in which the system is shocked. The IRF's are shown with 90% confidence intervals, which are obtained by Monte Carlo simulation. Parameter values are drawn from the asymptotic joint distribution of parameters, and a simulated IRF is computed. The procedure is repeated 1000 times.

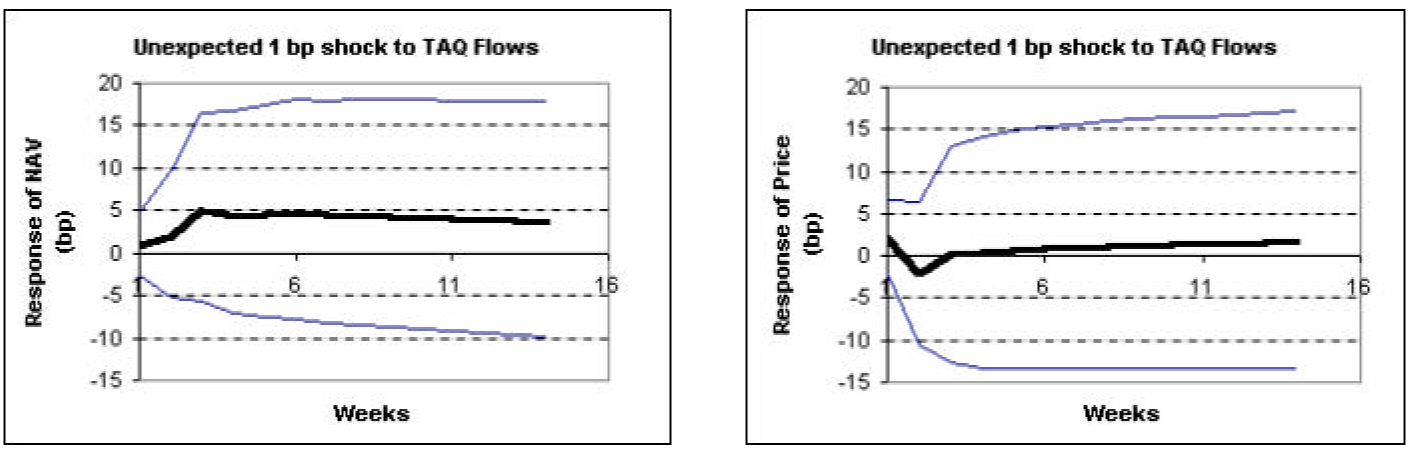

Fig. 3. Impulse response functions: all funds. The cumulative impulse response functions for the NAV and Price to Institutional Investor TAQ Flow innovations are shown here. Parameters are from the VECM as reported in Tables 4a and 4b. Each impulse response function is derived by generating an innovation to one of the endogenous variables in the system, while holding the others fixed. The impact of the innovations on the cointegrating vector is kept track of following every period in which the system is shocked. The IRF's are shown with 90% confidence intervals, which are obtained by Monte Carlo simulation. Parameter values are drawn from the asymptotic joint distribution of parameters, and a simulated IRF is computed. The procedure is repeated 1000 times.

Appendix: Funds, Regions and Countries

Numbers in parentheses represent the total number of funds from the country in the dataset.

Regions and Funds	Ticker Symbol	Start Date	Country	Exchange
Developed Markets				
First Australia Fund	IAF	5-Aug-94	Australia	AMEX
Austria Fund	OST	5-Aug-94	Austria	NYSE
Germany Fund	GER	5-Aug-94	Germany (2)	NYSE
New Germany Fund	GF	5-Aug-94		NYSE
Irish Investment Fund	IRL	5-Aug-94	Ireland	NYSE
Italy Fund	ITA	5-Aug-94	Italy	NYSE
Japan Equity Fund	JEQ	5-Aug-94	Japan (2)	NYSE
Japan OTC Equity Fund	JOF	5-Aug-94		NYSE
Spain Fund	SNF	5-Aug-94	Spain	NYSE
Swiss Helvetia Fund	SWZ	5-Aug-94	Switzerland	NYSE
Emerging Markets				
Latin America				
Argentina Fund	AF	5-Aug-94	Argentina	NYSE
Brazil Fund	BZF	5-Aug-94	Brazil (2)	NYSE
Brazilian Equity Fund	BZL	5-Aug-94		NYSE
Chile Fund	CH	5-Aug-94	Chile	NYSE
Mexico Equity & Income Fund	MXE	5-Aug-94	Mexico (2)	NYSE
Mexico Fund	MXF	5-Aug-94		NYSE
Emerging East Asia				
Indonesia Fund	IF	5-Aug-94	Indonesia (2)	NYSE
Jakarta Growth Fund	JGF	5-Aug-94		NYSE
Fidelity Advisor Korea Fund	FAK	4-Nov-94	Korea (4)	NYSE
Korea Equity Fund	KEF	5-Aug-94		NYSE
Korea Fund	KF	5-Aug-94		NYSE
Korean Investment Fund	KIF	5-Aug-94		NYSE
Malaysia Fund	MF	5-Aug-94	Malaysia	NYSE
First Philippine Fund	FPF	5-Aug-94	Philippines	NYSE
Singapore Fund	SGF	5-Aug-94	Singapore	NYSE
ROC Taiwan Fund	ROC	5-Aug-94	Taiwan (3)	NYSE
Taiwan Equity Fund	TYW	5-Aug-94		NYSE
Taiwan Fund	TWN	5-Aug-94		NYSE
Thai Capital Fund	TC	5-Aug-94	Thailand (2)	NYSE
Thai Fund	TTF	5-Aug-94		NYSE
Emerging Europe				
Portugal Fund	PGF	5-Aug-94	Portugal	NYSE
Turkish Investment Fund	TKF	5-Aug-94	Turkey	NYSE
Other Emerging Markets				
India Fund	IFN	5-Aug-94	India (4)	NYSE
India Growth Fund	IGF	5-Aug-94		NYSE
Jardine Fleming India Fund	JFI	5-Aug-94		NYSE
Morgan Stanley India Inv. Fund	IIF	5-Aug-94		NYSE
First Israel Fund	ISL	5-Aug-94	Israel	NYSE
Pakistan Investment Fund	PKF	5-Aug-94	Pakistan	NYSE
Southern Africa Fund	SOA	5-Aug-94	South Africa	NYSE