The Dynamics of International Equity Market Expectations

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Abstract

This paper uses a noisy rational expectations model to derive predictions about the dynamic behavior of the proportion of institutional money managers in a given country who are bullish about the equity markets of different countries. The predictions are tested using monthly data for four capital markets for the period October 1995 to October 2000. The empirical findings are consistent with the hypothesis of informational asymmetries between capital market participants in different countries.

1 Introduction

There is now extensive evidence that international flows of equity capital are positively correlated with the returns on the markets of the destination countries. At least three explanations for this positive correlation are plausible. First, as Brennan and Cao (1997) have argued, the positive correlation could be due to asymmetry of information between foreign and domestic investors. According to this asymmetric information theory, the expectations of less well informed foreigners respond more elastically to economic news than do the expectations of domestic investors; as a result, good news for example, which is associated with positive stock returns, also leads foreigners to purchase stock from domestic investors, creating a positive correlation between foreign purchases and domestic stock returns. Second, it is possible that exogenous shocks to the demands of foreigners for domestic stock cause domestic stock prices and foreign stock ownership to move in the same direction; for example, an increase in the wealth of US residents due to a rise in the US stock market or a decline in US interest rates could lead US residents to increase their demand for UK stock, producing both positive UK stock returns and positive US purchases of UK stock. We refer to this as the price impact theory. Third, it is possible that foreign investors follow 'portfolio insurance' strategies with respect to the domestic market; such strategies are not necessarily associated with information asymmetry[1] but would also lead to a positive association between domestic stock returns and foreign purchases. In this paper we discriminate between these theories by using data on investor expectations. We show that there is a strong tendency for foreign institutional investors to become more bullish about a given national market following a positive return on that market; on the other hand, there is no evidence that domestic institutional investors become more bullish. This behavior of foreign and domestic investor perceptions is consistent with the asymmetric information theory advanced by Brennan and Cao (1997), but is not predicted by either the price impact theory or the portfolio insurance theory. Thus, while we cannot rule out the importance of the price impact of equity purchases by foreigners or of portfolio insurance trading, our evidence provides support for the hypothesis that information asymmetry is an important determinant of international capital flows.

The framework for our analysis is a dynamic version of the multi-asset noisy rational expectations model of Admati (1985), which we use to analyze the determinants of the proportion of investors in country m who are bullish and bearish about the equity market in country k. The basic assumption underlying the model is that domestic investors are better informed about the payoffs on domestic assets than are foreign investors. This causes the beliefs of foreign investors to be more sensitive to new public information than are the beliefs of domestic investors, and therefore foreign investors buy from domestic investors when there is good news

[1] Leland (1980) shows that investors whose risk tolerance increases with wealth more rapidly than the average will follow portfolio insurance strategies even under homegeneous information.

and asset prices rise, and sell to domestic investors when there is bad news and asset prices fall. In order to focus attention on the role of information asymmetry, exchange rate risk and interest rate differentials are ignored, and the analysis is conducted in a model with many trading periods but only a single terminal consumption period.

The implications of the model are tested using survey data on the perceptions of institutional investors about the future returns on the stock markets of various countries. The primary data come from the Merrill Lynch monthly *Fund Manager Survey*, which is completed by around 250 large institutional managers around the world. We show that institutional investors tend to be more bullish about the stock market of their country of residence. More importantly, we show that foreign investors become more bullish (bearish) about a country as the returns of that country's market portfolio increase (decrease), while this is not true of domestic investors. This is consistent with foreign, but not domestic, investors being at an informational disadvantage relative to all investors in a given market.

Although the very notion of informational asymmetries between institutional investors in different countries may seem suspect in the world of modern communications, recent work by Coval and Moskowitz (1999a, b) shows that physical propinquity, even within the same country, is important for the portfolio composition and profits of institutional investors,[2] and Hau (2001) shows that the profits of professional traders in German stocks are higher for those located in Germany or in German speaking countries. These papers are part of a growing literature on differential information endowments in financial markets and the role of distance in portfolio composition. Gehrig (1993) uses the differential information hypothesis to explain the home bias phenomenon; Portes and Rey (2000) and Portes *et al.* (2001) provide empirical evidence that distance and other variables that capture informational asymmetries have significant explanatory power for the volume of inter-country portfolio flows; Grinblatt and Keloharju (2000, 2001) and Huberman (2001) demonstrate the effect of distance on the composition of the domestic portfolios of individuals; Kang and Stulz (1997) argue that informational asymmetry can account for the observed preference of foreigners for large firms in Japan. Brennan and Cao (1997) and Brennan and Aranda (1999) use a framework similar to the one presented here to predict trend following behavior by foreigners in international equity and debt markets respectively, and provide evidence of trend following by foreigners in certain markets. Such trend following behavior has also been reported by Warther (1994) for mutual fund investors, by Karolyi (2001) for foreign investors in Japan, by Froot *et al.* (2001) for foreign investors who use a particular US custodian, by Choe *et al.* (1999, 2001) and Kim and Wei (2002) for foreign investors in Korea, by Grinblatt and Keloharju (2000) for foreign investors in Finland, by Griffin, Nardari and Stulz (2003) for foreign investors in nine small emerging markets, by Richards (2002) and Edison and Warnock (2003) for US investors in emerging

[2] See also Grinblatt and Keloharju (2001).

Asian markets, and by Dahlquist and Robertsson (2001) for foreign investors in Sweden. On the other hand, Hamao and Mei (2001) argue that foreign investors in Japan tend to be long term contrarians, and Grinblatt and Keloharju (2000) argue that foreign institutional investors are the most sophisticated class of investors in Finland, despite the fact that they pursue momentum strategies.[3] Seasholes (2000) presents evidence that foreigners have an informational advantage in emerging markets.

Interpreting the implications of this body of evidence for the differential information hypothesis is complicated by the fact that different studies use data at different frequencies, ranging from transactions data to quarterly flow data. Moreover, while the theoretical model of information asymmetry predicts a contemporaneous relation between flows and returns, realistic information and decision making lags suggest that flows from less well-informed foreign investors might well lag returns, at least at high frequencies. Many of the empirical studies report only the results of regressing flows on lagged returns and interpret their findings in terms of 'trend-chasing' behavior or 'momentum investing' without asking why it is *foreign* investors who are prone to such behavior. Even a finding of a contemporaneous relation between flows and returns may be difficult to interpret in terms of information asymmetry since, as mentioned above, price impact and portfolio insurance based theories predict a similar relation, so that evidence on the relation between flows and returns cannot be conclusive about information asymmetry. Therefore, in this paper, instead of examining the relation between flows and returns, we examine the relation between reports of investor perceptions and returns. Understanding how the expectations of different classes of investor are formed and change over time is important for a better understanding of the portfolio choice and dynamic trading strategies of investors and firms in international financial markets. Despite the continuing home bias in investor portfolios, during the last two decades holdings of foreign equities have become increasingly important, cross-border equity flows have increased dramatically, and international cross-listing of shares has become common.[4]

The remainder of the paper proceeds as follows. Section 2 extends the model first developed by Brennan and Cao (1997) to an economy with a large number of trading sessions. Its implications for the behavior of the fraction of investors in a given country who are bullish about the stock market of another country are developed in Section 3. Section 4 describes the data and Section 5 reports the empirical findings, which imply that foreign institutional investors in a given country's equity market are at an informational disadvantage relative to the average investor in that market. The evidence is particularly strong for the Japanese market and for Japanese institutions in foreign markets.

[3] Grinblatt and Keloharju (2000) find that foreign investors appear to make the most profitable individual stock trades in Finland during the period 1995–96. In contrast, Kang and Stulz (1997), using annual data for ten years, find no evidence that foreign investors outperform domestic investors in Japan; Shukla and Inwegen (1995) show that UK funds managers investing in the US underperform local managers, and Timmermann and Blake (1999) show that UK pension funds lose from timing decisions in foreign markets.

[4] Pagano *et al.* (2002).

2 A General Model

We first extend the results of Brennan and Cao (1997) to an economy in which the number of trading sessions becomes large.[5] Thus, we consider a multi-asset noisy rational expectations model in the spirit of Admati (1985). The payoff on the M risky assets is represented by the $M \times 1$ normally distributed random vector $\tilde{U}$ with mean $\bar{U}$ and precision matrix H. The payoff vector $\tilde{U}$ is realized at time 1. Without loss of generality, the riskless interest rate is taken as zero. There is a continuum of investors indexed by i, $i \in [0,1]$. Each investor i, is endowed at time 0 with risky assets denoted by the vector $\tilde{X}_0^i$, and investors are characterized by exponential utility functions defined over time 1 consumption with common coefficient of absolute risk aversion $1/r$. The vector of aggregate per capita supply of the risky assets at time 0, $\tilde{X}_0$, is normally and independently distributed with mean $\bar{X}_0$ and precision matrix Φ_0. There are T trading sessions that take place at times $t = \tau h, \tau = 0, \ldots, T-1$, where $h = 1/T$ is the length of time between trading sessions. The asset payoffs are realized and consumption takes place at time 1: there is no intermediate consumption in the model.

Immediately prior to trading session τ, each investor i obtains an $M \times 1$ vector of *private* signals about the asset payoff vector, $\tilde{Z}_\tau^i$, where

$$\tilde{Z}_\tau^i = \tilde{U} + \tilde{\epsilon}_\tau^i,$$

and $\tilde{\epsilon}_\tau^i$ is distributed normally and independently of $\tilde{U}$, has mean zero, and is independent of $\tilde{\epsilon}_j^k$, if $k \neq i$ or $j \neq \tau$. In order to preserve the information structure as the number of trading sessions increases, the precision matrix of the private (and public) signals received by investors is scaled to reflect the length of time between trading sessions, so that the precision matrix of the private signals received by investor i in session τ is $S_\tau^i(h) \equiv hS_\tau^i$. In addition to the private signals, a vector of *public* signals is released immediately before each trading session $\tau = 0, \ldots, T-1$. The public signals are represented by the $M \times 1$ vector $\tilde{Y}_\tau$, where

$$\tilde{Y}_\tau = \tilde{U} + \tilde{\eta}_\tau,$$

and $\tilde{\eta}_\tau$ is normally distributed with mean zero and precision matrix $N_\tau(h) \equiv hN_\tau$.[6] New liquidity traders are assumed to enter the market in each trading session after the initial session, $\tau = 1, \ldots, T-1$; the incremental net supply of these traders is represented by the normally distributed random vectors $\tilde{X}_\tau$, which have mean zero and precision matrices $\Phi_\tau(h) \equiv \Phi_\tau/h$. For simplicity, we impose $\bar{X}_\tau = 0$ for $\tau > 0$. We assume that the volume of trading is not observable by investors.

The elements of the precision matrices S_τ^i are assumed to be uniformly bounded, and S_τ, the population

[5] See also Brennan and Cao (1996).

[6] We assume that $N_0 = N_T^{-1} = O$ where O is a zero matrix to reflect the assumption that there is no public information at time 0 and that the returns on all risky assets are realized at time 1.

average of the (unscaled) precision matrices at trading session τ is given by,

$$S_\tau \equiv \int_0^1 S_\tau^i \, di.$$

We follow the convention used by Admati (1985) in defining the integral of random variables in the continuum economy with multiple risky assets. If $(\tilde{V}_i)_{i\in[0,1]}$ is a process of independent random variables with zero mean and bounded variance, and $(\tilde{W}_i)_{i\in[0,1]}$ is almost surely integrable, then $\int_0^1(\tilde{V}_i+\tilde{W}_i)\,di = \int_0^1 \tilde{W}_i\,di$.[7] For example, this convention implies that $\int_0^1 \tilde{Z}^i = \tilde{U}$, a.s. and $\int_0^1 S_t^i\tilde{Z}^i = S_t\tilde{U}$, a.s.

Let $\tilde{P}_\tau$ denote the vector of equilibrium risky asset prices, and $\tilde{D}_\tau^i$ the vector of risky asset demands of investor i in trading session τ at time $t \equiv \tau h$, and let $\tilde{I}_\tau$ be the public information set including the prices at trading session τ, and $\tilde{I}_\tau^i$ be the information set of investor i at trading session τ. Then the following theorem describes the risky asset prices and investor asset demands at the date of each market session in a noisy rational expectations equilibrium (Brennan and Cao, 1997).

Theorem 1 *There exists a partially revealing rational expectations equilibrium in the T trading session economy in which the vectors of risky asset prices, $\tilde{P}_\tau$, and individual asset demands, $\tilde{D}_\tau^i$, in trading session τ (at time $t \equiv \tau h$) are given by,*

$$\tilde{P}_\tau = K_\tau^{-1}(K_\tau - \sum_{j=0}^{\tau} hS_j)\tilde{\mu}_\tau + K_\tau^{-1}\sum_{j=0}^{\tau} hS_j\tilde{U} - K_\tau^{-1}\sum_{j=0}^{\tau}\tilde{X}_j/r, \tag{1}$$

$$\tilde{D}_\tau^i = rK_\tau^i[\tilde{\mu}_\tau^i - \tilde{P}_\tau] = rh[\sum_{j=0}^{\tau}\{S_j^i\tilde{Z}_j^i - S_j\tilde{U} + \tilde{X}_j/rh - (S_j^i - S_j)\tilde{P}_\tau\}] \tag{2}$$

where

$$\tilde{\mu}_\tau^i \equiv E(\tilde{U}|\tilde{I}_\tau^i) = (K_\tau^i)^{-1}(H\bar{U} + h\sum_{j=0}^{\tau}[N_j\tilde{Y}_j + S_j^i\tilde{Z}_j^i + r^2S_j\Phi_jS_j\tilde{Q}_j])$$

$$\tilde{\mu}_\tau \equiv E(\tilde{U}|\tilde{I}_\tau) = (K_\tau - \sum_{j=0}^{\tau} hS_j)^{-1}(H\bar{U} + h\sum_{j=0}^{\tau}[N_j\tilde{Y}_j + r^2S_j\Phi_jS_j\tilde{Q}_j])$$

$$\tilde{Q}_j = \tilde{U} - r^{-1}h^{-1}S_j^{-1}(\tilde{X}_j - \bar{X}_j)$$

$$K_\tau^i \equiv \mathrm{Var}^{-1}[\tilde{U}|\tilde{I}_\tau^i] = H + h\sum_{j=0}^{\tau}[S_j^i + N_j + r^2S_j\Phi_jS_j]$$

$$K_\tau \equiv \int_0^1 K_\tau^i\,di = H + h\sum_{j=0}^{\tau}[N_j + S_j + r^2S_j\Phi_jS_j].$$

Equation (1) expresses the equilibrium price as the precision weighted average of the individual agents' conditional expectations of the asset payoff, minus a risk premium. The first term is the component of

[7] Our economy can be viewed as a limiting economy in which the number of investors goes to infinity. Admati's convention then follows from the law of large numbers. See He and Wang (1995) for a similar treatment.

the weighted average expected payoff that is associated with public information. The second term is the component that is due to the private signals received by investors. The third term is the risk premium. The demand function (2) expresses investor i's demand as a function of the investor's risk tolerance, conditional precision matrix at time t, and assessment of the risk premium at time t.

Equation (1) implies that the price change vector, $\Delta\tilde{P}_\tau \equiv P_\tau - P_{\tau-1}$ can be written as,

$$\Delta\tilde{P}_\tau = K_\tau^{-1}[h\{N_\tau(\tilde{Y}_\tau - \tilde{P}_{\tau-1})\} + \{r^2 S_\tau \Phi_\tau S_\tau(\tilde{Q}_\tau - \tilde{P}_{\tau-1})\} + \{S_\tau(\tilde{U} - P_{\tau-1})\} - \{\tilde{X}_\tau/r\}]. \tag{3}$$

The first term in braces in equation (3) is the 'innovation' in the public signal, $\tilde{Y}_\tau - \tilde{P}_{\tau-1}$, weighted by the precision of the public signal, N_τ. The second term is the innovation in the average of the private signals that is revealed by prices, $\tilde{Q}_\tau - \tilde{P}_{\tau-1}$, weighted by the precision of the price signal, $r^2 S_\tau \Phi_\tau S_\tau$. The third term is the innovation in the precision-weighted average of the private signals, $\tilde{U} - P_{\tau-1}$, weighted by the average precision of the private signals, S_τ. The last term is the shock from liquidity traders in trading session τ. When the innovations in all the signals, $\tilde{Y}_\tau - \tilde{P}_{\tau-1}$, $\tilde{Q}_\tau - \tilde{P}_{\tau-1}$, and $\tilde{U} - P_{\tau-1}$, and the supply shock, $\tilde{X}_\tau$, are zero, the price change vector is zero.

The change in investor i's optimal holdings of the M securities between trading sessions τ and $\tau - 1$, ΔD_τ^i, is given by,

$$\begin{aligned}\Delta\tilde{D}_\tau^i &\equiv \tilde{D}_\tau^i - \tilde{D}_{\tau-1}^i \\ &= r\left[\left\{hS_\tau^i(\tilde{Z}_\tau^i - \tilde{P}_{\tau-1}) - hS_\tau(\tilde{U} - \tilde{P}_{\tau-1})\right\} + \left\{\frac{\tilde{X}_\tau}{r}\right\} - \left\{h\sum_{j=0}^{\tau}(S_j^i - S_j)\Delta\tilde{P}_\tau\right\}\right].\end{aligned} \tag{4}$$

The first term in equation (4) is the difference between the precision weighted innovation in investor i's private signal, $hS_\tau^i(\tilde{Z}_\tau^i - \tilde{P}_{\tau-1})$, and the average precision weighted innovation in all private signals, $hS_\tau(\tilde{U} - \tilde{P}_{\tau-1})$. The second term is the supply shock that must be absorbed by all investors. The third term is the product of the price change vector, $\Delta\tilde{P}_\tau$, and the difference between the cumulative precision of i's private signals and the population average of the cumulative precision of all private signals. The coefficient of $\Delta\tilde{P}_\tau$, which determines the relative response of investors' demands to public information, is investor i's *cumulative information advantage*, defined as $h\sum_{j=0}^{\tau}(S_j^i - S_j)$. The demands of investors with a *cumulative information disadvantage* are more sensitive to public information than the demands of the average investor so that the coefficient of $\Delta\tilde{P}_\tau$ in equation (4) is positive. As a result, these less well informed investors tend to act as trend followers. Similarly, investors with a cumulative information *disadvantage* tend to act as contrarians.

The expected change in the individual's holdings conditional on the realized vector of price changes, ΔP_τ, can be written as,

$$E[\Delta\tilde{D}_\tau^i|\Delta\tilde{P}_\tau] = r\left[\omega_\tau^i(h)A_\tau\Delta\tilde{P}_\tau + E[\tilde{X}_\tau/r|\Delta\tilde{P}_\tau] - \Omega_\tau^i\Delta\tilde{P}_\tau\right], \tag{5}$$

where $\omega_\tau^i(h) \equiv h(S_\tau^i - S_\tau)$, $A_\tau \equiv \mathrm{Cov}[\tilde{U} - \tilde{P}_{\tau-1}, \Delta\tilde{P}_\tau]\mathrm{Var}^{-1}[\Delta\tilde{P}_\tau]$, and $\Omega_\tau^i \equiv h\sum_{j=0}^{\tau}(S_j^i - S_j)$.

In equation (5) $\omega_\tau^i(h)$ represents the *marginal* information advantage of investor i arising from private signals received in the interval $(t-h, t]$, where $t = \tau h$ and Ω_τ^i represents investor i's *cumulative* information advantage from all private signals received up to trading session τ. As the time between trading sessions $h \to 0$, $\omega_\tau^i(h) \to 0$, while Ω_τ^i is unaffected. Hence as $h \to 0$, the expected change in the investor's holdings, conditional on the realized vector of price changes, becomes,

$$E[\Delta\tilde{D}_\tau^i|\Delta\tilde{P}_\tau] = E[\tilde{X}_\tau|\Delta\tilde{P}_\tau] - r\Omega_\tau^i\Delta\tilde{P}_\tau, \tag{6}$$

In what follows we shall assume that h is small so that $\omega_\tau^i(h)$ can be neglected and we can use equation (6) to describe the conditional expected change in asset holdings or trade vector.

In order to understand equation (6), consider first an average investor a, whose cumulative precision is equal to the average precision of all investors so that $\Omega_\tau^a = 0$. The conditional trade vector of this average investor is,

$$E[\Delta\tilde{D}_\tau^a|\Delta\tilde{P}_\tau] = rB_\tau\Delta\tilde{P}_\tau\,, \tag{7}$$

where the $M \times M$ matrix B_τ, is given by

$$\begin{aligned} B_\tau &\equiv \frac{\mathrm{Cov}[\tilde{X}_\tau, \Delta\tilde{P}_\tau]\mathrm{Var}^{-1}[\Delta\tilde{P}_\tau]}{r} \\ &= -\left(\frac{\Phi_\tau^{-1}}{r^2} + S_\tau\right)\left(N_\tau + 2S_\tau + r^2 S_\tau\Phi_\tau S_\tau + \frac{\Phi_\tau^{-1}}{r^2}\right)^{-1} K_\tau \\ &= -K_\tau - \left(\frac{\Phi_\tau^{-1}}{r^2} + S_\tau\right)(K_\tau - K_{\tau-1})^{-1} K_\tau. \end{aligned}$$

B_τ captures the responsiveness of price changes to the supply shock, $\tilde{X}_\tau$.

Without further specification, equations (6) and (7) place little restriction on the behavior of conditional trade vectors. In order to obtain sharp results on the conditional trade vector we make the following intuitive assumption.

Assumption A: The average investor's demand curve is downward sloping.

Assumption A implies that the diagonal elements of B_τ are negative, so that an increase in the supply of asset k leads to a decrease in its price. A sufficient condition for $diag\{B_\tau\} < 0$ is that the supply noise precision matrices, $\Phi_\tau(h)$, the public information precision matrices, N_τ, and the average private information precision matrices, S_τ, are diagonal. Alternatively, B_τ will be negative definite so that $diag\{B_\tau\} < 0$ if $K_{\tau-h}$ and K_τ are proportional to each other: this would be the case if, for example, the proportionate rate at which uncertainty about asset payoffs is resolved through time were the same for all assets.

The conditional trade vector of an investor i for whom $\Omega_\tau^i \neq 0$, depends on the difference between B_τ and his *cumulative information advantage* matrix, Ω_τ^i:

$$E[\Delta\tilde{D}_\tau^i|\Delta\tilde{P}_\tau] = r[B_\tau - \Omega_\tau^i]\Delta\tilde{P}_\tau. \tag{8}$$

Equation (8) provides the basis for our analysis of changes in institutional investor perceptions.

3 International Investment and Investment Perception

In order to use the above framework to analyze the investment perceptions of institutional investors in an international context we shall assume that each of the risky assets corresponds to the market index of a different country, $m = 1, \ldots, M$. We consider a continuum of "institutional" investors, each of whom is domiciled in a given country but can invest in all M countries. We are concerned with the implications of differences in informational endowments between investors domiciled in different countries; in particular, with the implications of differences in information about market m between investors who are domiciled in country m and those who are domiciled abroad. We use $\mu^m \equiv \int_{i\in m} di$ to denote the measure of institutional investors domiciled in country m. We assume that there is no currency risk, and that all institutional investors domiciled in a given country have the same private signal precision matrix, so that $S_\tau^i \equiv S_\tau^m$, $\forall\, t$ and $i \in m$. Define $\bar{D}_\tau^m \equiv (\mu^m)^{-1} \int_{i\in m} D_\tau^i\, di$ as the vector of average investment allocations at session τ for institutional investors domiciled in country m. Then, using equation (2), the average institutional investment vector for country m can be written as,

$$\bar{D}_\tau^m = r \sum_{j=0}^{\tau} \left((S_j^m - S_j)(\tilde{U} - P_\tau) + \tilde{X}_j/r \right), \tag{9}$$

where $S_j^m \equiv (\mu^m)^{-1} \int_{i\in m} S_j^i\, di$ is the private information precision matrix of institutional investors in country m at trading session j. .

Let $\Delta\bar{D}_\tau^m \equiv \bar{D}_\tau^m - \bar{D}_{\tau-1}^m$ denote the average trade vector at session τ for institutions domiciled in country m. Then it follows from equation (8) that,

$$E[\Delta\bar{D}_\tau^m|\Delta\tilde{P}_\tau] = (\mu^m)^{-1} \int_{i\in m} E[\Delta\tilde{D}_\tau^i|\Delta\tilde{P}_\tau]\, di = r\left[B_\tau - \Omega_\tau^m\right]\Delta\tilde{P}_\tau, \tag{10}$$

where $\Omega_\tau^m = (\mu^m)^{-1} \int_{i\in m} \Omega_\tau^i\, di = \Omega_\tau^i \quad \forall i \in m$.

Let $\Delta\bar{d}_{k,\tau}^m$, the k^{th} element of the vector $\Delta\bar{D}_\tau^m$, denote the change in the average holding by institutional investors domiciled in country m of securities in country k. Then

$$\Delta\bar{d}_{k,\tau}^m = \sum_{l=1}^{M} \Theta_{kl}^m \Delta P_{l\tau} + \nu_{k\tau}^m, \tag{11}$$

where, dropping the time subscripts, $\Theta^m_{kl} \equiv r[B_{kl} - \Omega^m_{kl}]$, and ν^m_k is an orthogonal, mean zero, error term. Equation (11) is essentially equivalent to equation (8) of Brennan and Cao (1997) who use it to describe international flows of investment capital. They show that if foreign investors are less well informed than domestic investors about the domestic market, then $\Theta^m_{kk} > 0$ so that the purchase of domestic stocks by foreign investors is positively correlated with the domestic market return. This prediction is supported by their evidence of US purchases of stocks in emerging markets and certain developed markets.[8]

Here we are concerned with the behavior of *expectations*; in particular, with the fraction of (institutional) investors in each country who describe themselves as bullish or bearish about the stock market in their own and the other countries. For this reason we must be concerned with the *differences* between the investment vectors of institutional investors domiciled in the *same* country. Theorem 1 and equation (9) imply that the investment vector of institutional investor i in country m, $\tilde{D}^i_\tau$, is related to the average institutional investment vector for country m, $\bar{D}^m_\tau$, by,

$$\tilde{D}^i_\tau = \bar{D}^m_\tau + r \sum_{j=0}^{\tau} S^m_j \tilde{\epsilon}^i_j. \tag{12}$$

This implies that the conditional variance–covariance matrix of the investment vectors of institutional investors in country m, Ξ^m_τ, is given by,

$$\Xi^m_\tau \equiv \mathrm{Var}[\tilde{D}^i_\tau | i \in m, \bar{D}^m_\tau] = r^2 \sum_{j=0}^{\tau} \left(h S^m_j(h)\right)^2 \mathrm{Var}(\epsilon^i_j) = r^2 h \sum_{j=0}^{\tau} S^m_j. \tag{13}$$

Let $d^i_{k,\tau}$ and $\bar{d}^m_{k,\tau}$ denote the k^{th} elements of the vectors $\tilde{D}^i_\tau$ and $\bar{D}^m_\tau$. Then $d^i_{k,\tau}$, the demand at session τ by institutional investor i in country m, for the equity of country k, is distributed normally with mean $\bar{d}^m_{k,\tau}$, and variance $\xi^m_{k,\tau}$, where $\xi^m_{k,\tau}$ is the k^{th} diagonal element of Ξ^m_τ.

To operationalize the concept of "bullishness" or "bearishness" , we define an investor $i \in m$ as "bullish" about country k if and only if his demand for holdings in market k is positive, so that $d^i_{k,\tau} > 0$. Then the probability that a particular institutional investor in country m is bullish, which is equal to the fraction of institutional investors who are bullish, is denoted by $F^m_{k,\tau}$ where,

$$F^m_{k,\tau} = \aleph\left(\frac{\bar{d}^m_{k,\tau}}{\sqrt{\xi^m_{k,\tau}}}\right), \tag{14}$$

and $\aleph(.)$ denotes the cumulative normal distribution.

[8] See also Grinblatt and Keloharju (2000), Choe *et al.* (1999, 2001), Dahlquist and Robertsson (2001), Froot *et al.* (2001), Karolyi (2001), Kim and Wei (2002), Richards (2002), Edison and Warnock (2003), and Griffin, Nardari and Stulz (2003). Griffin, Nardari and Stulz (2003) and Richards (2003) find that inflows to small emerging markets from foreign investors are positively correlated with the lagged returns of the resident country of the foreign investors.

Denote the change in the fraction of institutional investors in country m who are bullish about market k by $\Delta F^m_{k,\tau} \equiv F^m_{k,\tau} - F^m_{k,\tau-1}$, and denote the vector of price changes by $\Delta P_\tau \equiv P_\tau - P_{\tau-1}$. Using a Taylor Series expansion, the change in the fraction of institutional investors in country m who are bullish about market k can be written in terms of the change in $\bar{d}^{mk}_\tau$, the average institutional demand, as

$$\Delta F^m_{k,\tau} = a^m_{k,\tau} + n(z^m_{k,\tau}) \frac{1}{\sqrt{\xi^m_{k,\tau}}} \Delta \bar{d}^m_{k,\tau}, \tag{15}$$

where $z^m_{k,\tau} \equiv \bar{d}^m_{k,\tau}/\sqrt{\xi^m_{k,\tau}}$, $n(.)$ denotes the normal probability density, and $a^m_{k,\tau}$ denotes changes in $F^m_{k,\tau}$ unrelated to changes in $\bar{d}^m_{k,\tau}$. Then, using equation (11) and dropping the time subscript, the change in the fraction of investors in country m who are bullish about market k can be written as,

$$\Delta F^m_k = a^m_k + \sum_{l=1}^{M} \Lambda^m_{kl} \Delta P_l + \eta^m_k, \tag{16}$$

where $\Lambda^m_{kl} \equiv n(z^m_k)(\xi^m_k)^{-1/2}[B_{kl} - \Omega^m_{kl}]$ and η^m_k is a mean zero error term. Since $rn(z^m_k)(\xi^m_k)^{-1/2} > 0$, Λ^m_{kl} is proportional to $B_{kl} - \Omega^m_{kl}$. Under Assumption A, $B_{kk} < 0$ and $\Omega^m_{kk} \leq (\geq) 0$ if institutional investors in country m are at an informational disadvantage (advantage) in market k. Therefore, under Assumption A, equation (16) provides two key predictions.

- **Result 1:** If *domestic* institutional investors have an information *advantage* in their home market ($\Omega^m_{mm} \geq 0$) then $\Lambda^m_{mm} \leq 0$.
- **Result 2:** If *foreign* institutional investors are at an information *disadvantage* in market k ($\Omega^m_{kk} \leq 0$) then, since $B_{kk} < 0$, Λ^m_{kk} may be positive or negative. However, a positive value of Λ^m_{kk} implies that $\Omega^m_{kk} \leq 0$: foreign institutional investors are at an informational disadvantage in market k.

In the following section we report estimates of the parameters Λ^m_{kl} and compare the signs of $\Lambda^m_{kk}, m \neq k$ and Λ^m_{mm} to detect evidence of informational asymmetries between domestic investors in their home market and investors in foreign markets.

A Restricted Model

The behavior of expectations is greatly simplified if we assume that the coefficient matrix Λ^m, which is proportional to $(B - \Omega^m)$, is diagonal. Ω^m will be diagonal if investors receive private information only about their domestic market, and the elements of B will be small if the variance of supply noise is low. These conditions are sufficient for the following assumption.

Assumption B: Approximately diagonal coefficient matrix

$$\Lambda^m_{kl} \approx 0, \forall\, k \neq l.$$

Under Assumption B the change in the fraction of institutional investors in country m who are bullish about market k can be written as:

$$\Delta F_k^m = a_k^m + \Lambda_{kk}^m \Delta P_k + \eta_k^m, \tag{17}$$

where $\Lambda_{kk}^m = rn(z_k^m)(\xi_k^m)^{-1/2}[B_{kk} - \Omega_{kk}^m]$.

Under the Restricted Model,

- if domestic institutional investors have an information advantage relative to the average investor then $\Omega_{mm}^m > 0$, $\Lambda_{mm}^m \leq 0$;
- a finding that $\Lambda_{kk}^m \geq 0$ implies that $\Omega_{kk}^m < 0$, since $B_{kk} < 0$. Thus $\Lambda_{kk}^m > 0$ implies that foreign institutional investors are uninformed relative to the average investor.

4 Data

The primary data come from the Merrill Lynch monthly *Fund Manager Survey*. Every month Merrill Lynch surveys around 250 large fund managers around the world. As well as reporting global views on markets, the economy, and important topical issues, the survey elicits information from fund managers in different geographical areas on their equity allocations in different markets, their asset allocations, and their views on the prospects for different markets, by region, style and industry. Merrill Lynch commission the Gallup Organization to undertake the survey by canvassing the views of a panel of fund managers, who answer questions by phone or fax. As an indication of the scope of the survey, the March 2001 survey, for example, covered 222 institutions with total funds under management of $8.7 trillion. This compares with a world stock market capitalization at the end of 2001 of $25.3 trillion reported by Solnik and McLeavey (2003). The surveys are normally conducted over a period of up to 10 days during the first two weeks of each month. The March 2001 survey began on 2 March and ended on 7 March. In some markets, such as South Africa, the coverage of fund managers is essentially complete. In other markets, the survey covers a comprehensive closed panel, rather than a sample of fund managers. There is no requirement that fund managers be Merrill Lynch clients. The break-down of fund type for March 2001 was: pension fund, 7%; insurance company, 8%; hedge fund, 1%; investment manager, 67%; investment advisor, 13%; other, 5%. The break-down of the positions of the individuals surveyed was: Chief Investment Officer, 20%; Strategist/Economist, 22%, Portfolio Manager, 37%; Research Analyst, 7%; Trader, 2%; other, 13%. Portfolio managers, research analysts, and traders are in positions where they are familiar with the house-view on global investment. Although the survey currently covers fund managers from the US, Continental Europe, the UK, Japan, the Asia-Pacific Basin, and South

Africa, we follow Strong and Xu (2003) in restricting our analysis to Continental Europe, UK, Japan and the US in order to obtain a reasonable time series of data.

We analyze the survey question: "Please indicate whether you are bullish, bearish or neutral on the following ASSET classes on a 12 month view." This question remained constant over our sample period. The survey reports the balance of bullish and bearish managers for each equity market over the next 12 months as a percentage. For example, forecasting in early December 1998 for the US market in 1999, bulls outnumbered bears among US fund managers, the balance of bulls minus bears being 9% of the US fund managers surveyed. Although the survey does not give the detailed breakdown behind this figure, a 9% balance of bulls minus bears would result if, for example, 52% of fund managers were bullish, 5% were neutral, and 43% were bearish. In this paper we calculate the *change* in the proportion of investors who report themselves as bullish about a particular market, ignoring those who are neutral. As a timing convention, we calculate the change in the proportion who are bullish for October as the difference between the proportion calculated from the September survey and the proportion calculated from the October survey. Our change in proportion bullish series runs from November 1995 to March 2001 so that we have 64 monthly observations.[9] We use the Morgan Stanley Capital International return series for the monthly returns on the corresponding four stock markets.[10] The returns are for the calendar month so that, if we were to relate changes in bullishness to the 'contemporaneous' returns on the stock markets we would be relating the return for October to the change in the survey results from September to October. It is possible then that an increase in bullishness in the first week of October for example would *cause* an increase in stock prices during the month, so that the causation would run from bullishness to returns. Since we are interested in the reaction of investors to public information including that contained in stock prices, rather than in the effects of investor perception on stock prices, we shall relate changes in bullishness to *lagged* stock price changes. Thus we shall relate the change in bullishness between September and October to the returns realized in the month of September. Since the bullishness recorded in the October survey is bullishness relative to the prices in October it cannot have caused the returns during September. Our maintained hypothesis is that information that becomes public during September affects both the September returns and the change in bullishness between September and October.[11] In addition to tests that use lagged returns we also report tests that use the difference between the changes in bullishness of foreign and domestic investors as the dependent variable. It is unlikely that an increase in the *relative* bullishness of foreign investors would cause

[9] Merrill Lynch revised the structure of their Fund Manager Survey in April 2001. Among other changes they dropped the respondent's domicile and also altered the question(s) relating to bullishness/bearishness.

[10] These returns exclude dividends but, since dividend payments are small, this should have little effect on our results.

[11] Regressions that relate changes in bullishness to unlagged returns in fact yield much fewer significant coefficients: changes in EU and UK bullishness about Japan are positively related to the Japanese market return. In addition changes in UK bullishness about Japan are (negatively) related to US returns; changes in Japanese bullishness about the EU and UK markets are positively related to the Japan market return; and changes in Japanese bullishness about the US market are negatively related to the EU market return.

an increase in stock prices since in most markets the holdings of foreign investors are small relative to those of domestic investors.

The Survey also reports the proportional balance of investors who plan to increase their exposure to a given market over those who plan to decrease their exposure. We use these data to calculate a 'change in exposure' variable analogous to the change in bullishness variable. We do not use this as our primary variable of interest because, while news that leads portfolio managers to revise their portfolios will be reflected in their degree of bullishness about a given market, it will not be reflected in their *plans* to change exposure reported at the start of the month to the extent that it has already been acted on within the previous month.

5 Results

5.1 Behavior of Normalized Demands

To compare the time series behavior of the fraction of bullish investors across country pairs it is convenient to express them in terms of $z^m_{k,t} \equiv \aleph^{-1}(F^m_{k,t})$ where $F^m_{k,t}$ is the fraction of investors in country m who are bullish about market k at time t and $\aleph(.)$ denotes the cumulative normal distribution. $z^m_{k,t}$ is the normalized demand of individual institutions in country m where the normalization is by the standard deviation of institutional demand, and the normalized demand is computed from the fraction of institutions that report themselves as bullish about a given market, using equation (14). Table 1 reports summary statistics for the normalized demands for the four countries. Panel A reports the time series mean normalized demand by institutions in each country for equity in the other countries. Two facts stand out. First, the mean normalized demand for the equity of the home market exceeds the corresponding figure for all markets, except for the case of institutions domiciled in the US whose mean normalized demand for foreign markets exceeds that for the US market.[12] In fact the US is anomalous in that it is the only country for which the normalized demand from institutions domiciled in all countries except the US itself is *negative* during this period and, as we have just mentioned, US institutions have higher demands for foreign than for US equities. Second, for each market the normalized demand from institutions domiciled abroad is lower than the normalized demand from domestic institutions. In other words, institutions have higher domestic than foreign demands (with the exception of US institutions), and markets attract higher normalized average demands from their domestic institutions than from foreign institutions. These results are simply another manifestation of the home bias that has been documented by French and Poterba (1991), Cooper and Kaplanis (1994) and Tesar

[12]This corresponds to the finding of Strong and Xu (2003, Table 1) that US fund managers were on average more bullish about foreign equities than about US equities during this period.

and Werner (1995).[13] Panel B reports the corresponding time series standard deviations of the normalized demands: the most striking observation here is the much higher variability of demands for equities in Japan relative to other countries. Moreover, the standard deviation of domestic investors' normalized demand in domestic markets is lower than the average standard deviation of foreign investors' normalized demand with the exception of the Japanese market. Similarly, the standard deviation of domestic investors' normalized demand in domestic markets is lower than the average standard deviation of their normalized demand in foreign markets with the exception of UK investors.

Table 2 reports correlations between normalized demands from institutions in one country for the equity of all countries. Each table in panel A shows, for institutions domiciled in a given country, the correlations of their normalized mean demand for investments in the four countries. The correlation patterns are quite different across institutions in the four countries, which is consistent with them having access to different information. Particularly striking is the negative correlation between demands for Japanese and UK equity which is in the range -0.4 to -0.6, except for Japanese institutions for which the correlation is 0.22. Similarly, the correlation between demands for Japanese and US equity is in the range -0.4 to -0.6, again except for Japanese institutions for which the correlation is 0.01. Each table in panel B reports the correlations between demands for a given country's equity coming from institutions domiciled in each of the four countries. Now all of the correlations are positive indicating that institutions tend to agree about the attractiveness of a given market. For the EU market, the highest correlations are between Japanese, EU and UK demands; the correlations between US demands and UK and Japanese demands are only about half as high. For the UK and US markets in contrast, Japanese demands have the lowest correlations with those of institutions in other countries; the overall level of correlations is higher for the US market than for the EU and UK markets. Finally, the demand correlations are highest for the Japanese market for which the lowest correlation is 0.70.

Table 3 reports the covariance and precision matrix of the monthly returns for the four countries. All returns are positively correlated.

5.2 Investor Perceptions and Returns

Table 4 reports regressions of the changes in the fraction of bullish investors on the four lagged market returns, corresponding to equation (16):

$$\Delta F^m_{k,t} = a^m_k + \sum_{l=1}^{4} b^m_{kl} R_{l,t-1} + e^m_{k,t}$$

[13] Many explanations have been offered to explain home bias, including transaction costs, purchasing power parity violations, differential taxation, exchange rate risk, political risk and asymmetric information. See Stulz (1999) for a review. More recently, Glassman and Riddick (2001) have argued that a combination of transaction costs, differential perception of risk and missing assets affecting correlations is promising in explaining home bias.

where $R_{l,t-1}$ is the one month lagged return on market l. Panel A relates only to changes in bullishness about *foreign* equity markets ($m \neq k$) while panel B concerns the *domestic* equity market. We have argued that when the change in the fraction of institutional investors who are bullish about *foreign* market k is regressed on all market returns, the coefficient on the return on market k, the "own"-market return, will be positive *only if* the institutional investors are less well informed about market k than the average investor. The relevant coefficients are shown in bold type in panel A. 10 out of the 12 coefficients are positive implying that the foreign institutions tend to be at an informational disadvantage, except possibly in the US market where both the negative coefficients arise (they are both insignificant). When the coefficients for the EU return in the regressions for the EU market are constrained to be equal across institutions domiciled in foreign countries, the constrained estimate of the coefficient is 1.30 ($t = 3.12$), so that a 1% increase in the EU return is on average associated with a 1.30% increase in the proportion of foreign institutional investors who are bullish about European capital markets; the constrained estimate of the coefficient for the UK return in the UK market regressions is 1.76 ($t = 3.82$); for Japan the corresponding figure is 1.05 ($t = 4.79$); and for the US it is -0.26 ($t = -0.85$). Thus only the US market regressions are consistent with the null hypothesis that foreign investors do not suffer from an informational disadvantage. This is consistent with the findings of Brennan and Cao (1997) who report that, while portfolio flow data suggest that US investors are often at an informational disadvantage in foreign markets, there is no evidence to suggest that foreign investors are at an informational disadvantage in the US market.

Turning next to the characteristics of the institutions domiciled in the different countries, we see that EU institutions have a significant positive coefficient on the "own"-market return[14] in the regressions for the UK and Japanese markets, implying an informational disadvantage in those markets; UK institutions have a significant positive coefficient on the "own"-market return only in the Japanese market regression. Japanese institutions have significant positive coefficients on the "own"-market returns for the EU and UK market regressions, while for US institutions none of the "own"-market return coefficients is significant.[15] When the coefficients on the"own"-market return are constrained to be the same across all foreign markets for a given institutional domicile, estimates of the constrained coefficient are as follows: for EU institutions 0.87 ($t = 3.02$); for UK institutions 0.87 ($t = 3.08$); for Japanese institutions 0.60 ($t = 1.58$)—the high coefficients for Japanese institutions in the EU and UK markets being offset by a negative but insignificant coefficient in the US market; and for US institutions 0.50 ($t = 1.91$). These results suggest that US institutions especially may be at less of an informational disadvantage in foreign markets than institutions domiciled in the other countries. However, even for the US the "own"-market return coefficient is positive, though insignificant for all three foreign markets.

[14] That is, on the Japanese market return when the dependent variable is the change in the fraction bullish about Japan etc.
[15] For US institutions the "own"-market return for the UK is significant at the 10% level.

Panel B reports similar regression results when the change in the bullishness of the institutions is about the market of their home country. If institutional investors possess an informational advantage in their home markets we should expect these coefficients (shown in bold) to be negative as discussed in Section 3. In fact, only the coefficients for Japan and the US are negative, and neither coefficient is significant. When the own-market return coefficient is constrained to be equal across the four countries the estimate is -0.05 ($t = -0.20$). The large positive (but insignificant) coefficient for the EU provides the least evidence of a home market informational advantage for EU investors; it is possible that this is due to the different markets, languages and accounting systems used by different countries in Continental Europe and suggests that EU fund managers may to some extent be 'foreigners at home'. We conclude that there is no evidence from this unrestricted model that institutional investors possess an informational advantage in their domestic market.

As a robustness check on the results shown in Table 4, we repeat the regressions using as the dependent variable for each country k the *difference between* the change in the proportion of bulls about market k among institutions domiciled in country m and the corresponding change among institutions domiciled in country k itself,

$$\Delta F^m_{k,t} - \Delta F^k_{k,t} = a^m_k + \sum_{l=1}^{4} b^m_{kl} R_{l,t-1} + e^m_{k,t}.$$

If foreign institutional investors are at an informational disadvantage and domestic institutional investors are at an informational advantage, we should expect the coefficients on the market k return (shown in bold in Table 5) to be positive, since the coefficient for foreign institutions would be positive and for domestic institutions negative. The advantage of using the difference between the changes in the fraction of foreign and domestic bulls is that it reduces the possibility of spurious results caused by a global increase in bullishness being associated with positive market returns.[16] The results shown in Table 5 are broadly consistent with the results reported in panel A of Table 4: 10 out of the 12 coefficients are positive. Consistent with the earlier results, the most significant coefficients are for Japanese institutions in the EU market, EU institutions in the UK market, and UK institutions in the Japanese market. If the coefficient of the 'own' market is constrained to be the same across all regressions the estimated value is 0.45 with a t-statistic of 3.63.

Panel A of Table 6 reports the results of tests of the restricted model in which only the return on the market for which the demands are being analyzed, the "own"-market return, is included as an independent variable. The results are broadly consistent with those for the general model. There is now reliable evidence that Japanese institutional investors suffer from an informational disadvantage in the EU and UK markets. US institutions are at a disadvantage in Japan, but the coefficients for the UK and Japanese market regressions while positive, are not significant;[17] UK institutions are at a disadvantage in Japan but not in

[16] This might be possible for example if a global increase in bullishness in the second half of September led to an increase in September returns, *and* portfolio managers reported an increase in bullishness in October *even after the stock price increase.*

[17] Brennan and Cao (1997, Table I) find stronger evidence that (all) US residents are at an informational disadvantage in

the EU or the US. Thus, institutions in all four countries of domicile are at a disadvantage in at least one foreign market. Panel B reports the results obtained when the change in the bullish proportion of domestic institutional investors is subtracted from the corresponding change for foreign investors in a given market. While the evidence for the foreigner information disadvantage hypothesis is now less strong, the results are broadly consistent with those in panel A and 11 out of 12 of the coefficients are positive as the foreign investor disadvantage/domestic investor advantage hypothesis predicts. When the coefficient of the foreign market is constrained to be the same across all investor domiciles and foreign markets the estimated coefficient is 0.67 ($t = 4.51$). Panel C reports the results of a regression in which the dependent variable is the change in the proportion of investors planning to increase their exposure to the market of concern. The results are broadly similar to those in panel A: institutions tend to plan an increase in exposure to the foreign market following a positive return, and the effect is especially pronounced for Japanese institutions in the EU and the UK, and for EU and UK institutions in Japan.

Panel D reports the results of regressing the change in the proportion of bullish *domestic* institutions on the local market return. The negative and significant coefficients for the UK and the US are consistent with the hypothesis that institutions in these countries enjoy an informational advantage in their domestic markets. When the coefficient is constrained to be the same across markets its estimated value is -0.29 ($t = -1.80$), providing modest support for the hypothesis that domestic institutions in general enjoy an informational advantage. Panel E shows that domestic institutions tend to reduce their planned exposure to the market following a positive return, the effect being especially pronounced for UK institutions.

Robustness tests

In order to examine the conditional information set dynamics of our results, Tables 7A–D report the results of vector autoregressions of changes in the proportions of investors who are bullish about each market for all four domiciles and the return on the target market. There is no evidence of any significant lagged cross effects between the change in bullishness for a given domicile and the corresponding change for another domicile—in particular foreign institutions' change in bullishness shows no tendency to lag the change for domestic institutions. On the other hand, for all four domiciles and for all four markets, there is substantial evidence that the change in the fraction of investors who are bullish about a market in a given month is negatively related to the corresponding change in the previous month. This negative auto-correlation could be induced by errors in the observation of the fraction bullish in a given market caused either by the finite number of institutions sampled in a given month or by our *ad hoc* treatment of those who report themselves as neutral. The coefficients of the change in fraction bullish on the lagged "own" market return are broadly consistent with those already reported in Tables 4–6. For each market, returns are positively (but not

Japan and Germany than in Canada or the UK.

significantly) related to the lagged change in the fraction of domestic investors who are bullish for all four markets; thus any domestic institutional information advantage does not manifest itself strongly in the data during the first month over our sample period.

Table 8 reports some further tests for the robustness of our findings.[18] These tests take the form of the addition of certain control variables, $Z^m_{k,t-1}$, to the regression of the change in the fraction of investors in country m who are bullish about market k,

$$\Delta F^m_{k,t} = a + bR_{k,t-1} + cZ^m_{k,t-1}.$$

Panel A shows that the addition of the lagged change in the proportion who are bullish does not change materially the results reported in panel A of Table 6. The point estimates of the coefficients of the "own"-market return are little changed—however, we now find significant evidence that US institutions are at an informational disadvantage in the UK market. Panel B shows that the addition of the lagged change in the fraction of bullish institutions in the country of the target market has no effect on the results, and panel C shows that the coefficients of the lagged market return for the domestic market regressions are also little affected by the inclusion of the lagged change in the fraction of institutions who are bullish about the domestic market, although the lagged change in the fraction bullish is itself highly significant.

In regressions that are not reported here, the inclusion of the lagged market return of the country of domicile has no significant effect on the coefficient of the lagged "own"-market return, and the coefficient of the lagged return of the country of domicile is insignificant except in the regression for the change in the fraction of EU institutions that are bullish about the UK market. In this regression, the lagged EU market return enters with a highly significant *negative* sign, and the coefficient of the UK market return, which was negative and insignificant in Table 6 panel A, becomes positive and highly significant. While the coefficient of the UK market return is consistent with EU institutions being at an informational disadvantage in the UK market, we place little emphasis on this result since our theory does not predict the negative coefficient on the lagged EU return. Overall, there is no evidence that domestic market returns 'push' expectations about foreign markets.[19] Similarly, the inclusion of the returns on the 'own' market over months $(t-2)$–$(t-4)$ as a control has no effect on our results—there is no evidence that the change in proportion bullish about a given market reflects a slow adjustment to past information.

[18] We are grateful to the referee for suggesting these robustness tests.

[19] In contrast, Griffin et al. (2003) report evidence that international capital flows to small markets are positively influenced by global market returns.

5.3 Bullishness and Portfolio Allocations

Our model of the change in the proportion of investors who are bullish about a given market predicts that this change will be positively correlated with both the change in the mean demand of the investors and the proportion of investors whose demand for equity of that market is positive. To fully establish the role of asymmetric information in international portfolio flows it would be necessary to link the changes in the fraction of institutional investors who are bullish about a given market and their purchases of equity in that market. Unfortunately, we do not have data on the portfolio behavior of institutional investors that is linked to their expectations. However, the Merrill Lynch Survey does include a question about investor intentions to buy or sell: the Survey reports the balance of respondents who are planning to increase their exposure to a given market over those who are planning to decrease exposure. We convert this statistic to the proportion of net buyers by assuming that the proportion who do not plan to alter their exposure is zero. Table 9 reports the correlations between changes in the proportion of bullish investors and changes in the proportion who plan to increase their exposure to each market. The correlations are all positive and are typically between 0.4 and 0.6 for foreign markets; the correlations for the domestic market are noticeably lower (except for the UK).[20] To the extent that intentions can be taken as a proxy for actions, this provides confirmatory evidence of the role of asymmetric information in flows of portfolio capital, at least between certain countries.

It is also possible to relate changes in bullishness to reported flows of portfolio capital in certain cases. The US Treasury reports gross and net securities transactions between residents of the US and other countries on a monthly basis.[21] There are three limitations to the use of these data. First, they relate only to transactions between the US and other countries, and we have seen that there is no evidence that foreign institutional investors are at an informational disadvantage in the US market. Secondly, the data include all transactions, and not just those of institutional investors.[22] Thirdly, "the monthly transactions reports were designed to provide information on the country *through which a transaction was made,* and that country is not necessarily the same as the country in which the security's issuer, purchaser or seller is resident."[23] This reporting procedure not only results in a bias towards overcounting flows to countries that are major financial centers, but means that flows for such countries cannot simply be equated with purchases of the domestic market portfolio about which the bullishness is expressed; this concern is likely to be particularly acute for flows to the US and the UK.

[20] Strong and Xu (2003) report similar correlations between the *levels* of these variables.
[21] The data are available at http://www.treas.gov/tic/.
[22] Note that capital flows associated with country specific mutual funds such as the US quoted *Japan Fund* are determined primarily by the investment decisions of the individuals who invest in the fund and not by the fund manager.
[23] Griever, Lee and Warnock (2001, 640). Emphasis added.

Despite these limitations, we compare the US Treasury data on capital flows with the change in proportion bullish variable as follows. First, to allow for the upward trend in the magnitude of flows, each monthly observation is normalized by dividing by the average of the absolute values of the flows in the previous four periods.[24] Then the normalized monthly flows for the period 1996:03 to 2001:03 between the US and the other three countries are regressed on the corresponding market returns.[25] In results not tabulated, all but one of the coefficients of the market return are positive: the coefficient of the Japan market return in the regression of US purchases of 'foreign' securities from Japan is highly significant, and the corresponding coefficient in the regression of US purchases of 'foreign' securities from (continental) Europe is marginally significant. This is consistent with US residents being at an informational disadvantage in these markets. The coefficients for the UK and for the three regressions in which the independent variable is the US market return are not significant. This is consistent with a lack of information asymmetry between the relevant countries;[26] it is also consistent with mis-measurement of foreign purchases of the market portfolios of these countries because of their role as major financial centers.

Table 10 reports the results of regressing the normalized capital flows on the current and one period forward values of our change in proportion bullish variable. This regression specification was chosen because, while the capital flows are for the calendar month, the change in proportion bullish for month t, $\Delta F^m_{k,t}$, is measured as the change from the first ten days of month $t-1$ to the first ten days of month t, so that it is necessary to include both the current and one period forward variable to capture all of the change in bullishness that is contemporary with the capital flows.[27] We find that capital flows from the US to the EU and Japan are both significantly positively related to the change in perception of US institutional investors about the EU and Japan. On the other hand there is no significant relation for US capital flows to the UK or for capital flows to the US. As already mentioned, these countries correspond to major financial centers so that the capital flow data may not relate well to foreign purchases of *domestic* equities. Moreover, our previous tests reveal no evidence of an information disadvantage for foreign investors in the US market or for US investors in the UK market.

[24] This is similar to the procedure followed by Brennan and Cao (1997).

[25] The flow from the US to Japan in a given month is defined as gross purchases by US residents from Japanese residents of "foreign securities" less gross sales of "foreign securities" by Japanese residents to US residents; we are implicitly treating these "foreign securities" as corresponding to the Japan domestic market portfolio.

[26] Our previous results suggested that only Japanese institutional investors are at an informational disadvantage in the UK, and that insititutional investors in none of the countries are at a disadvantage in the US.

[27] We would also expect the capital flow for month t to be associated with $\Delta F^m_{k,t}$ if capital flows lag changes in perception.

6 Summary and Conclusions

In this paper we have developed new implications of the hypotheses that domestic institutional investors enjoy an informational advantage and foreign institutional investors an informational disadvantage in a country's equity market relative to the average investor in that market. In particular, we have shown that, under certain auxiliary assumptions, the domestic institutional investor informational advantage hypothesis implies that when the change in the fraction of domestic institutional investors who are bullish about the domestic market is regressed on foreign and domestic market returns the coefficient on the domestic market return will be negative. Under a restricted model that makes the stronger assumption of symmetric information endowments the hypothesis is that the same sign restriction holds in a simple regression in which the given market return is the only independent variable. The foreign institutional investor informational disadvantage hypothesis implies that when the dependent variable is the change in the fraction of institutional investors in a given foreign country who are bullish about a particular market the coefficient on that market return will be positive.

These hypotheses were tested using survey data on institutional investor views on four different equity markets. There is strong evidence that, consistent with the foreign (institutional investor) information disadvantage hypothesis, the fraction of bullish foreign institutional investors tends to increase following a rise in the domestic equity market. This is most pronounced for investors who are domiciled in Japan, and least pronounced for investors who are domiciled in the US. It is also most pronounced for foreign institutional perceptions with respect to the Japanese market and least pronounced for perceptions with respect to the US market. There is also evidence of a domestic (institutional investor) information advantage for institutions domiciled in the UK and the US, in that for both countries the proportion of investors who are bullish about the domestic market declines following a positive return on that market; there is no evidence of such a domestic information advantage for EU or Japanese institutions. These findings are robust to the inclusion of control variables to capture the possibility that changes in bullishness are influenced by lagged market returns or lagged changes in bullishness, by changes in bullishness among institutions domiciled in the country of the market concerned, or by returns on the market of investor domicile. The evidence of a foreign institutional investor disadvantage is consistent with the arguments made by Brennan and Cao (1997) that international portfolio flows of equity capital are driven, at least in part, by informational considerations, and while there is only limited data on inter-country portfolio flows, changes in perception are shown to be significantly related to reported aggregate monthly portfolio flows from the US to both the EU and Japan.

Table 1
Inter-country normalized security demands: 1995:10–2001:03

This table reports statistics for the normalized demand variable $z^m_{k,t} \equiv \aleph^{-1}(F^m_{k,t})$, where $F^m_{k,t}$ is the fraction of investors in country m who are bullish about market k in month t and $\aleph(.)$ denotes the cumulative normal distribution. Panel A reports means of normalized demands; Panel B reports standard deviations of normalized demands.

	A: Mean Normalized Demand for Equity in:					
Domicile of Institution	EU	UK	Japan	US	Mean All Markets	Mean Home Market
EU	0.86	0.23	0.49	−0.06	0.38	0.86
UK	0.66	0.45	0.50	−0.31	0.33	0.45
Japan	0.31	0.00	0.71	−0.07	0.23	0.71
US	0.53	0.21	0.34	0.07	0.29	0.07
Mean: All Domiciles	0.59	0.22	0.51	−0.10		
Mean: Domestic Domicile	0.86	0.45	0.71	0.07		

	B: Standard Deviation of Normalized Demand for Equity in:					
Domicile of Institution	EU	UK	Japan	US	Mean All Markets	Mean Home Market
EU	0.15	0.23	0.41	0.22	0.25	0.15
UK	0.20	0.22	0.44	0.23	0.27	0.22
Japan	0.24	0.19	0.32	0.21	0.24	0.32
US	0.20	0.21	0.36	0.18	0.24	0.18
Mean: All Sources	0.20	0.21	0.38	0.21		
Mean: Domestic Source	0.15	0.22	0.32	0.18		

Table 2
Correlations between inter-country normalized security demands: 1995:11–2001:02

This table reports correlations between the normalized demands for one country's securities by institutions in another country; the normalized demand is $z^m_{k,t} \equiv \aleph^{-1}(F^m_{k,t})$, where $F^m_{k,t}$ is the fraction of investors in country m who are bullish about market k in month t and $\aleph(.)$ denotes the cumulative normal distribution.

A. Correlations between normalized demands from institutions in a given country for investments in four different countries

Demands from EU Institutions for Investment in:

	EU	UK	Japan	US
EU	1.00			
UK	−0.23	1.00		
Japan	0.05	−0.46	1.00	
US	−0.05	0.52	−0.55	1.00

Demands from UK Institutions for Investment in:

	EU	UK	Japan	US
EU	1.00			
UK	−0.06	1.00		
Japan	0.10	−0.62	1.00	
US	−0.24	0.64	−0.60	1.00

Demands from Japanese Institutions for Investment in:

	EU	UK	Japan	US
EU	1.00			
UK	0.35	1.00		
Japan	0.32	0.22	1.00	
US	0.31	0.60	0.01	1.00

Demands from US Institutions for Investment in:

	EU	UK	Japan	US
EU	1.00			
UK	0.16	1.00		
Japan	0.18	−0.38	1.00	
US	0.13	0.26	−0.42	1.00

B. Correlations between normalized demands for investments in a given country from institutions in four different countries

Demands for EU Investment from Institutions in:

	EU	UK	Japan	US
EU	1.00			
UK	0.38	1.00		
Japan	0.54	0.44	1.00	
US	0.42	0.26	0.21	1.00

Demands for UK Investment from Institutions in:

	EU	UK	Japan	US
EU	1.00			
UK	0.55	1.00		
Japan	0.30	0.19	1.00	
US	0.59	0.63	0.18	1.00

Demands for Japanese Investment from Institutions in:

	EU	UK	Japan	US
EU	1.00			
UK	0.80	1.00		
Japan	0.70	0.75	1.00	
US	0.86	0.84	0.73	1.00

Demands for US Investment from Institutions in:

	EU	UK	Japan	US
EU	1.00			
UK	0.82	1.00		
Japan	0.33	0.32	1.00	
US	0.66	0.74	0.28	1.00

Table 3
Covariance and precision matrices of annualized returns: 1995:11–2001:03

This table reports the covariance matrix and the corresponding precision matrix for the annualized monthly returns for the four markets.

	A. Covariance Matrix			
	EU	UK	Japan	US
EU	0.025	0.018	0.013	0.020
UK	0.018	0.045	0.008	0.015
Japan	0.013	0.008	0.035	0.013
US	0.019	0.015	0.013	0.027
	B. Precision Matrix			
	EU	UK	Japan	US
EU	102.44	−18.34	−12.36	−56.38
UK	−18.34	30.71	1.60	−5.06
Japan	−12.36	1.60	36.78	−10.11
US	−56.38	−5.06	−10.11	84.53

Table 4
Regressions of changes in the proportion of institutional investors domiciled in each country who are bullish about a given market on lagged market returns: 1995:12–2001:03

This table reports the results of the regressions: $\Delta F^m_{k,t} = a^m_k + \sum_{l=1}^{4} b^m_{kl} R_{l,t-1} + e^m_{k,t}$, where $R_{l,t-1}$ is the one month lagged return on market l (*per cent*), and $\Delta F^m_{k,t}$ is the change in the proportion of investors in country m who are bullish about market k (*per cent*). Panel A gives results for foreign equity markets ($m \neq k$); Panel B gives results for the domestic market ($m = k$). Absolute values of t-statistics are reported in parenthesis and coefficients of the "own"-market return are in bold.

A: Regressions of Change in Bullishness about a Foreign Market on Market Returns							
Market	Investor Domicile	Constant	EU	UK	Japan	US	R^2
k	m						
EU	UK	0.28	**0.12**	−0.41	−0.02	−0.05	−0.02
		(0.42)	**(0.38)**	(1.30)	(0.16)	(0.22)	
	Japan	−1.24	**1.27**	−0.42	−0.15	−0.25	0.16
		(1.31)	**(3.27)**	(0.95)	(0.71)	(0.88)	
	US	−1.22	**0.57**	−0.05	−0.22	0.07	0.04
		(1.32)	**(1.48)**	(0.11)	(1.09)	(0.26)	
UK	EU	0.51	−0.72	**0.99**	−0.48	−0.05	0.31
		(0.81)	(2.77)	**(3.42)**	(3.47)	(0.25)	
	Japan	−0.78	0.24	**0.82**	−0.26	−0.25	0.14
		(0.90)	(0.68)	**(2.04)**	(1.39)	(0.94)	
	US	−0.03	−0.55	**0.82**	−0.08	0.23	0.03
		(0.04)	(1.41)	**(1.87)**	(0.40)	(0.82)	
Japan	EU	−0.35	−0.81	0.73	**0.45**	0.22	0.06
		(0.35)	(2.00)	(1.56)	**(2.08)**	(0.75)	
	UK	0.31	−0.36	−0.04	**0.81**	0.01	0.19
		(0.36)	(1.01)	(0.11)	**(4.37)**	(0.02)	
	US	−0.77	−0.25	0.08	**0.32**	0.36	0.05
		(0.84)	(0.66)	(0.19)	**(1.59)**	(1.30)	
US	EU	0.57	−0.65	0.48	−0.17	**0.17**	0.04
		(0.71)	(1.98)	(1.30)	(0.97)	**(0.69)**	
	UK	0.38	−0.10	0.08	−0.11	**−0.11**	−0.02
		(0.55)	(0.36)	(0.24)	(0.72)	**(0.51)**	
	Japan	−1.68	1.29	0.02	−0.62	**−0.45**	0.20
		(1.64)	(3.06)	(0.04)	(2.77)	**(1.44)**	

Panel B: Regressions of Change in Institutional Bullishness about a Domestic Market on Market Returns						
Domestic Market	Constant	EU	UK	Japan	US	R^2
EU	−0.46	**0.36**	−0.25	−0.21	0.00	−0.00
	(0.83)	**(1.54)**	(0.95)	(1.70)	(0.02)	
UK	0.43	−0.11	**0.03**	−0.23	−0.17	0.06
	(0.58)	(0.36)	**(0.10)**	(1.40)	(0.75)	
Japan	−0.55	0.24	0.41	**−0.03**	−0.47	0.02
	(0.67)	(0.71)	(1.09)	**(0.15)**	(1.92)	
US	0.12	0.15	0.07	−0.43	**−0.27**	0.09
	(0.15)	(0.45)	(0.18)	(2.42)	**(1.08)**	

Table 5
Regressions of the difference between changes in the proportion of foreign investors who are bullish about a given market and changes in the proportion of domestic investors who are bullish about that market (*per cent*) on lagged market returns (*per cent*): 1995:12–2001:03

This table reports the results of the regressions:

$$\Delta F^m_{k,t} - \Delta F^k_{k,t} = a^m_k + \sum_{l=1}^{4} b^m_{kl} R_{l,t-1} + e^m_{k,t}$$

where $R_{l,t-1}$ is the one month lagged return on market l (*per cent*), and $\Delta F^m_{k,t}$ is the change in the fraction of investors in country m who are bullish about market k (*per cent*). Absolute values of t-statistics are reported in parenthesis, and coefficients of the "own"-market return are in bold.

		$\Delta F^m_{k,t} - \Delta F^k_{k,t} = a^m_k + \sum_{l=1}^{4} b^m_{kl} R_{l,t-1} + e^m_{k,t}$					
Market	Investor Domicile	Constant	EU	UK	Japan	US	R^2
k	m						
EU	UK	0.75	**−0.25**	−0.16	0.19	0.04	−0.00
		(0.99)	**(0.81)**	(0.46)	(1.12)	(0.18)	
	Japan	−0.77	**0.92**	−0.17	0.06	−0.26	0.10
		(0.81)	**(2.33)**	(0.38)	(0.30)	(0.88)	
	US	−0.76	**0.21**	0.20	−0.01	0.07	−0.00
		(0.73)	**(0.49)**	(0.42)	(0.05)	(0.22)	
UK	EU	0.07	−0.60	**0.96**	−0.25	0.12	0.08
		(0.09)	(1.81)	**(2.55)**	(1.39)	(0.51)	
	Japan	−1.21	0.35	**0.78**	−0.03	−0.07	0.13
		(1.05)	(0.74)	**(1.45)**	(0.13)	(0.21)	
	US	−0.47	−0.43	**0.78**	0.15	0.40	0.14
		(0.51)	(1.15)	**(1.85)**	(0.74)	(1.46)	
Japan	EU	0.20	−1.05	0.31	**0.48**	0.70	0.10
		(0.18)	(2.27)	(0.59)	**(1.95)**	(2.06)	
	UK	0.85	−0.59	−0.45	**0.84**	0.48	0.21
		(0.84)	(1.42)	(0.96)	**(3.79)**	(1.56)	
	US	−0.22	−0.48	−0.33	**0.34**	0.83	0.08
		(0.19)	(1.02)	(0.62)	**(1.37)**	(2.39)	
US	EU	0.45	−0.80	0.41	0.27	**0.44**	0.01
		(0.41)	(1.80)	(0.82)	(1.13)	**(1.33)**	
	UK	0.26	−0.26	0.01	0.33	**0.16**	−0.01
		(0.27)	(0.62)	(0.02)	(1.50)	**(0.54)**	
	Japan	−1.80	1.14	−0.05	−0.18	**−0.18**	0.11
		(1.45)	(2.23)	(0.08)	(0.68)	**(0.47)**	

Table 6
Simple regressions of the difference between changes in the proportion of foreign investors who are bullish about a given market, or plan to increase their exposure to that market, and changes in the proportion of domestic investors who are bullish about that market on lagged market returns : 1995:12–2001:03

Panel A reports the results for each market, k, of simple regressions of the change in the proportion (*per cent*) of bullish institutional investors for each country of domicile, m, $\Delta F^m_{k,t}$, on lagged market returns, $R_{k,\,t-1}$ (*per cent*). In Panel B the dependent variable is the difference between the change in the fraction of bullish institutional investors from a given domicile and the change in the fraction of bullish domestic investors. In Panel C the dependent variable is the change in the proportion of institutional investors in country m who plan to increase their exposure to the given market (*per cent*), $\Delta X^m_{k,t}$. Panels D and E repeat Panels A and C when the country of institutional domicile is the same as the market. Figures in parenthesis are absolute values of t-statistics. Coefficients that are significant at the 5% level are in italics.

		A. $\Delta F^m_{k,t} = a + bR_{k,\,t-1}$			B. $\Delta F^m_{k,t} - \Delta F^k_{k,t} = a + bR_{k,\,t-1}$			C. $\Delta X^m_{k,t} = a + bR_{k,\,t-1}$		
Market	Investor Domicile	a	b	R^2	a	b	R^2	a	b	R^2
k	m									
EU	UK	0.52	−0.22	0.00	0.68	−0.25	0.02	0.18	−0.10	−0.01
		(0.79)	(1.70)		(0.92)	(1.75)		(0.29)	(0.81)	
	Japan	−0.96	*0.67*	0.16	−0.64	*0.54*	0.13	−0.62	*0.35*	0.20
		(1.04)	*(4.07)*		(0.69)	*(3.12)*		(1.10)	*(3.33)*	
	US	−-0.67	0.25	0.05	−0.59	0.27	0.03	−0.07	−0.07	−0.02
		(0.75)	(1.51)		(0.60)	(1.41)		(0.09)	(0.44)	
UK	EU	0.11	0.010	−0.02	−0.24	0.37	0.02	0.20	−0.09	−0.00
		(0.15)	(0.06)		(0.30)	(1.88)		(0.26)	(0.49)	
	Japan	−0.57	*0.63*	0.13	−0.88	*0.94*	0.17	−0.62	*0.36*	0.20
		(0.69)	*(4.06)*		(0.82)	*(3.85)*		(1.11)	*(3.33)*	
	US	−0.20	0.33	0.03	−0.58	0.73	0.14	0.20	−0.07	−0.00
		(0.22)	(1.70)		(0.60)	(1.40)		(0.23)	(0.38)	
Japan	EU	−0.76	*0.51*	0.04	−0.30	0.25	0.03	−0.42	*0.34*	0.04
		(0.81)	*(3.14)*		(0.28)	(1.30)		(0.56)	*(2.46)*	
	UK	−0.28	*0.57*	0.19	0.16	*0.50*	0.13	−0.16	0.21	0.05
		(0.35)	*(4.33)*		(0.16)	*(2.82)*		(0.25)	(1.80)	
	US	−0.63	*0.41*	0.06	−0.18	0.19	0.02	−0.43	0.26	0.01
		(0.75)	*(2.72)*		(0.17)	(0.98)		(0.55)	(1.97)	
US	EU	0.21	−0.05	−0.01	−0.38	0.36	−0.00	0.14	−0.03	−0.01
		(0.27)	(0.36)		(0.36)	(1.79)		(20)	(0.22)	
	UK	0.36	−0.17	0.01	−0.21	0.23	−0.01	0.16	0.01	−0.02
		(0.55)	(1.47)		(0.22)	(1.27)		(0.35)	(0.15)	
	Japan	−0.56	0.28	−0.01	−1.11	*0.66*	0.04	−0.10	0.06	−0.01
		(0.51)	(1.49)		(0.89)	*(2.85)*		(0.14)	(0.51)	

		D. $\Delta F^m_{m,t} = a + bR_{m,\,t-1}$			E. $\Delta X^m_{m,t} = a + bR_{m,\,t-1}$		
Market	Investor Domicile	a	b	R^2	a	b	R^2
EU	EU	−0.21	0.06	−0.01	0.63	−0.30	0.02
		(0.37)	(0.56)		(0.77)	(1.89)	
UK	UK	0.34	*−0.35*	0.03	0.59	*−0.53*	0.18
		(0.47)	*(2.05)*		((0.99)	*(3.99)*	
Japan	Japan	−0.44	0.06	−0.02	−0.29	0.12	−0.02
		(0.57)	(0.48)		(0.34)	(0.86)	
US	US	0.59	*−0.42*	0.05	0.49	−0.16	0.01
		(0.74)	*(3.06)*		(0.71)	(1.29)	

Table 7A

Vector autoregression results for perceptions about the European market

This table reports VAR estimates for institutional perceptions about the Continental European market for the period December 1995 to March 2001. $EU-EU$ is the change in the proportion of institutional investors in Europe who declare themselves as bullish about the European market. $UK-EU$ is the change in the proportion of institutional investors in the UK who are bullish about the European market. $Japan-EU$ and $US-EU$ are defined analogously for Japanese and US institutional investors. r_{EU} is the return on the MSCI index for Europe for the month. Returns and proportions bullish are measured in *per cent*. Absolute values of t-statistics are in parentheses.

	$EU-EU$	$UK-EU$	$Japan-EU$	$US-EU$	r_{EU}
$EU-EU(-1)$	−0.383	0.032	0.133	−0.063	0.049
	(3.13)	(0.60)	(0.60)	(0.20)	(0.31)
$UK-EU(-1)$	−0.058	−0.249	0.205	0.073	0.066
	(0.56)	(1.90)	(1.10)	(0.43)	(0.53)
$Japan-EU(-1)$	−0.044	0.0098	−0.180	0.175	−0.076
	(0.65)	(0.11)	(1.48)	(1.59)	(0.93)
$US-EU(-1)$	0.092	0.126	−0.024	−0.388	−0.009
	(1.73)	(0.25)	(0.70)	(3.26)	(0.10)
$r_{EU}(-1)$	0.088	−0.151	0.707	0.422	0.009
	(0.80)	(1.08)	(3.56)	(2.35)	(0.07)
Constant	−0.161	0.404	−0.975	−1.107	1.476
	(0.30)	(0.60)	(1.02)	(1.28)	(2.32)
$\bar{R}^2$	0.14	0.01	0.16	0.19	−0.06

Table 7B

Vector autoregression results for perceptions about the UK market

This table reports VAR estimates for institutional perceptions about the UK Market for the period December 1995 to March 2001. $EU-UK$ is the change in the proportion of institutional investors in Europe who declare themselves as bullish about the UK market. $UK-UK$ is the change in the proportion of institutional investors in UK who are bullish about the UK market. $Japan-UK$ and $US-UK$ are defined analogously for Japanese and US institutional investors. r_{UK} is the return on the MSCI index for Europe for the month. Returns and proportions bullish are measured in *per cent*. Absolute value of t-statistics are in parentheses.

	$EU-UK$	$UK-UK$	$Japan-UK$	$US-UK$	r_{UK}
$EU-UK(-1)$	−0.112	0.187	0.083	0.258	−0.016
	(0.79)	(1.35)	(0.58)	(1.70)	(0.17)
$UK-UK(-1)$	0.133	−0.197	0.205	0.090	0.116
	(0.91)	(1.39)	(1.40)	(0.58)	(1.20)
$Japan-UK(-1)$	−0.070	−0.063	−0.394	−0.043	−0.055
	(0.66)	(0.61)	(3.68)	(0.38)	(0.78)
$US-UK(-1)$	0.060	−0.120	−0.120	−0.511	−0.001
	(0.55)	(1.12)	(1.08)	(4.33)	(0.02)
$r_{UK}(-1)$	0.013	−0.036	0.733	0.384	−0.019
	(0.06)	(1.88)	(3.71)	(1.83)	(0.15)
Constant	0.094	0.363	−0.713	−0.252	0.740
	(0.12)	(0.49)	(0.94)	(0.31)	(1.48)
$\bar{R}^2$	−0.05	0.06	0.31	0.25	−0.04

Table 7C

Vector autoregression results for perceptions about the Japanese market

This table reports VAR estimates for institutional perceptions about the Japanese market for the period December 1995 to March 2001. *EU−Japan* is the change in the proportion of institutional investors in Europe who declare themselves as bullish about the Japanese market. *UK−Japan* is the change in the proportion of institutional investors in UK who are bullish about the Japanese market. *Japan−Japan* and *US−Japan* are defined analogously for Japanese and US institutional investors. r_{Japan} is the return on the MSCI index for Japan for the month. Returns and proportions bullish are measured in *per cent*. Absolute values of t-statistics are in parentheses.

	$EU-Japan$	$UK-Japan$	$Japan-Japan$	$US-Japan$	r_{Japan}
$EU-Japan(-1)$	−0.361	0.168	0.182	−0.070	0.231
	(2.91)	(1.68)	(1.71)	(0.63)	(2.73)
$UK-Japan(-1)$	0.028	−0.412	0.076	−0.104	0.028
	(0.21)	(3.84)	(0.67)	(0.87)	(0.31)
$Japan-Japan(-1)$	−0.146	−0.147	−0.191	0.141	−0.047
	(0.93)	(1.16)	(1.41)	(1.00)	(0.44)
$US-Japan(-1)$	0.193	0.149	0.076	−0.323	−0.100
	(1.40)	(1.34)	(0.64)	(2.61)	(1.06)
$r_{Japan}(-1)$	0.598	0.746	−0.083	0.481	−0.117
	(2.90)	(4.48)	(0.47)	(2.60)	(0.84)
Constant	−0.089	−0.385	−0.348	−0.859	0.083
	(0.98)	(0.52)	(0.45)	(1.05)	(0.13)
$\bar{R}^2$	0.14	0.35	0.02	0.17	0.05

Table 7D

Vector autoregression results for perceptions about the US market

This table reports VAR estimates for institutional perceptions about the US market for the period December 1995 to March 2001. $EU-US$ is the change in the fraction of institutional investors in Europe who declare themselves as bullish about the US market. $UK-US$ is the change in the fraction of institutional investors in UK who are bullish about the US market. $Japan-US$ and $US-US$ are defined analogously for Japanese and US institutional investors. r_{US} is the return on the MSCI index for US for the month. Returns and proportions bullish are measured in *per cent*. Absolute values of t-statistics are in parentheses.

	$EU-US$	$UK-US$	$Japan-US$	$US-US$	r_{US}
$EU-US(-1)$	−0.257	0.155	−0.103	0.220	0.003
	(1.86)	(1.36)	(0.54)	(1.60)	(0.03)
$UK-US(-1)$	0.100	−0.330	0.120	−0.116	0.049
	(0.61)	(2.45)	(0.53)	(0.71)	(0.38)
$Japan-US(-1)$	0.065	0.038	−0.368	−0.119	−0.135
	(0.71)	(0.50)	(2.94)	(1.31)	(1.88)
$US-US(-1)$	0.066	0.141	0.032	−0.249	0.024
	(0.52)	(1.34)	(0.18)	(1.97)	(0.23)
$r_{US}(-1)$	−0.088	−0.234	0.153	−0.271	−0.078
	(0.52)	(1.69)	(0.66)	(1.62)	(0.58)
Constant	0.222	0.530	−0.459	0.422	1.224
	(0.28)	(0.80)	(0.42)	(0.53)	(1.93)
$\bar{R}^2$	−0.00	0.07	0.06	0.13	−0.02

Table 8
Regressions of changes in the proportion of foreign investors who are bullish about a given market on lagged market returns and control variables : 1995:12–2001:03

Panel A reports the results for each market of regressions of the change in the proportion of bullish institutional investors for each country of domicile (*per cent*) on lagged market returns (*per cent*) and the lagged change in the proportion of bullish investors for that domicile. Panel B reports the results for each market of regressions of the change in the proportion of bullish institutional investors for each country of domicile (*per cent*) on lagged market returns (*per cent*) and the lagged change in the proportion of bullish institutional investors in the home country of the relevant market. Panel C reports the results for each market of regressions of the change in the proportion of bullish *domestic* institutional investors (*per cent*) on lagged market returns (*per cent*) and the lagged change in the proportion of bullish *domestic* institutional investors. Figures in parenthesis are absolute values of t-statistics, and coefficients that are significant at the 5% level are in italic.

		A. $\Delta F^m_{k,t} = a + bR_{k,\,t-1} + c\Delta F^m_{k,t-1}$				B. $\Delta F^m_{k,t} = a + bR_{k,\,t-1} + c\Delta F^k_{k,t-1}$			
Market	Investor Domicile	a	b	c	R^2	a	b	c	R^2
k	m								
EU	UK	0.50	−0.20	*−0.33*	0.05	0.51	−0.20	−0.24	−0.05
		(0.77)	(1.54)	*(3.40)*		(0.78)	(1.54)	(1.80)	
	Japan	−0.94	*0.67*	−0.13	0.16	−0.98	*0.68*	−0.02	0.14
		(1.02)	*(3.99)*	(1.50)		(1.06)	*(4.09)*	(0.09)	
	US	−0.80	0.26	*−0.35*	0.18	−0.68	0.27	−0.28	0.02
		(0.96)	(1.67)	*(4.22)*		(0.76)	(1.63)	(1.76)	
UK	EU	0.10	0.05	−0.18	-0.05	−0.11	− 0.01	0.14	−0.02
		(0.13)	(0.31)	(1.74)		(0.15)	(0.06)	(1.33)	
	Japan	−0.57	*0.61*	*−0.25*	0.26	−0.57	*0.63*	0.02	0.12
		(0.76)	*(4.03)*	*(3.95)*		(0.70)	*(4.07)*	(0.25)	
	US	−0.23	*0.41*	*−0.88*	0.23	−0.19	0.35	−0.15	0.01
		(0.29)	*(2.36)*	*(5.96)*		(0.22)	(1.81)	(1.25)	
Japan	EU	−0.97	*0.69*	*−0.39*	0.13	−0.83	*0.58*	−0.14	0.04
		(1.10)	*(4.13)*	(3.99)		(0.89)	*(3.40)*	(1.03)	
	UK	−0.47	*0.71*	*−0.37*	0.31	−0.31	*0.60*	−0.05	0.18
		(0.64)	*(5.56)*	*(4.61)*		(0.39)	*(4.14)*	(0.41)	
	US	−0.88	*0.49*	*−0.39*	0.18	−0.57	*0.36*	0.11	0.06
		(1.13)	*(3.23)*	*(3.91)*		(0.68)	*(2.20)*	(0.86)	
US	EU	0.24	−0.09	*−0.29*	0.03	0.18	−0.03	−0.07	−0.02
		(0.32)	(0.63)	*(3.02)*		(0.22)	(0.18)	(0.70)	
	UK	0.43	−0.18	*−0.30*	0.04	0.42	−0.21	0.15	0.02
		(0.67)	(1.58)	*(3.50)*		(0.64)	(1.81)	(1.89)	
	Japan	−0.61	0.30	*−0.32*	0.10	−0.53	0.25	0.05	−0.04
		(0.59)	(1.64)	*(3.42)*		(0.48)	(1.30)	(0.39)	

C. A. $\Delta F^k_{k,t} = a + bR_{k,\,t-1} + c\Delta F^k_{k,t-1}$

Market	Investor Domicile	a	b	c	R^2
EU	EU	−0.19	0.08	*−0.38*	0.14
		(0.37)	(0.74)	*(4.11)*	
UK	UK	0.39	*−0.36*	*−0.25*	0.04
		(0.54)	*(2.12)*	*(2.72)*	
Japan	Japan	−0.55	0.12	*−0.20*	−0.01
		(0.72)	(0.89)	*(2.04)*	
US	US	0.44	*−0.31*	*−0.30*	0.09
		(0.56)	*(2.08)*	*(3.35)*	

Table 9
Correlations between changes in investor perceptions and changes in investor plans: 1995:11–2001:03

This table reports correlations between changes in the proportion of institutional investors in a given domicile who are bullish about a given market and the change in the proportion who are planning to increase their exposure to that market.

Domicile of Institution	Market of Concern			
	EU	UK	Japan	US
EU	0.23	0.63	0.41	0.54
UK	0.29	0.59	0.48	0.52
Japan	0.61	0.47	0.27	0.32
US	0.49	0.43	0.59	0.27

Table 10
Regressions of Normalized Capital Flows on Changes in the Proportion of Institutional Investors who are Bullish about a Given Market:Sample: 1996:03–2001:02

This table reports regressions of the normalized capital flow from residents of country m to residents of country k, $Y^m_{k,t}$, on the change in the proportion of institutional investors in country m who are bullish about the equity market of country k, $\Delta F^m_{k,t}$ (*per cent*). Capital flows are measured during the calendar month and are normalized by dividing by the average of the absolute values of the capital flows over the previous four months; the change in bullishness for month t is the difference between the proportion bullish in the first week of month t and the proportion bullish at the same time in month $t-1$. Absolute value of t-statistics are in parentheses. Coefficients significant at 5% are in italics.

$Y^m_{k,t} = a_0 + a_1 \Delta F^m_{k,t} + a_2 \Delta F^m_{k,t+1}$					
Host Country	Source Country				
k	m	a_0	a_1	a_2	$\bar{R}^2$
EU	US	*−0.375*	*0.080*	0.050	0.02
		(2.13)	*(3.13)*	(1.90)	
UK	US	0.028	0.044	0.014	−0.02
		(0.13)	(1.49)	(0.45)	
Japan	US	*0.483*	*0.056*	*0.044*	0.10
		(2.53)	*(2.24)*	*(3.58)*	
US	EU	*0.950*	0.025	−0.013	−0.02
		(6.60)	(1.13)	(1.19)	
US	UK	*1.031*	0.036	−0.020	−0.00
		(6.10)	(1.15)	(0.64)	
US	Japan	0.164	−0.012	0.022	−0.04
		(0.81)	(0.52)	(0.93)	

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