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WHAT MOVES THE DISCOUNT ON COUNTRY EQUITY FUNDS?

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ABSTRACT

The paper characterizes several empirical regularities of closed-end fund prices and examines the extent to which a "sentiment" model of asset prices is consistent with the empirical regularities. We find that after controlling for the effect of cross-border investment restrictions, country funds trade at an average discount. Discounts vary substantially and contribute to a variance in country fund weekly returns which is generally three times greater than the returns on the net asset value (NAV). Regression analysis suggests that discounts have predictive power for fund returns but not for NAV returns, suggesting that investor "sentiment" is a component of the price of a fund and not its NAV. Estimation of an unobserved components model on the discounts of the funds reveals a significant and strongly persistent common component across fund discounts. Regressions of fund and NAV returns on financial variables reveal that fund prices are "sticky" with respect to movements in the host country's stock market and overly sensitive to variation in the U.S. and world stock markets. This relation is unaffected when we consider separately funds whose host countries restrict cross-border investment and funds which invest in emerging stock markets.

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Introduction

Country funds are publicly traded investment companies (closed-end funds) that trade on the open market and, unlike domestic-equity funds, hold and manage portfolios concentrating in the equity markets of particular *foreign* countries. Throughout the late 1980s and into the 1990s, country funds were the fastest growing segment of the public fund universe, and a minor sensation on Wall Street. In December 1984 only four U.S.-listed country funds existed. By December 1992, forty-one funds traded in New York, each specializing in one of twenty-six countries, and all together representing $4.3 billion in market value of equity.[1]

Figure 1 illustrates the recent growth in the number of U.S.-based country funds by charting the dollar volume of initial public offerings (IPOs) by fund and by year from 1981 to 1992. The rise in country fund IPOs parallels the growth in capitalization and liquidity in foreign stock markets. As of 1993, there were some forty foreign equity markets in the world, and non-U.S. equity market capitalization was twice as great as U.S. capitalization. The country funds allow U.S.-based investors to participate in the expansion of foreign markets by providing a managed and diversified portfolio at a minimal transaction cost, and without the use of foreign currencies to make settlements.[2,3]

Country funds have exhibited periods of high returns as well as high volatility. Like most publicly traded funds, country funds typically trade at substantial discounts to the underlying value of the portfolio they hold (the fund's net asset value or NAV). The discount, however, is not constant, and varies substantially over time. Anecdotal evidence suggests that the unusual volatility in country fund prices can be attributed to volatility in the discounts. Consider the changes in the discount/premium of the Mexico Fund from 1986 to 1993, shown in Figure 2a. The fund typically traded at a discount in the range of 0% to 40%. The discount varies substantially from week to week, occasionally turning into a premium. Variation in the Mexico Fund's discount is typical of many country funds and cannot be easily attributed to identifiable news events.

In addition to high volatility, some country funds have also experienced crash-like episodes unrelated to the state of the foreign stock market. Figure 2b shows the behavior in the discount of the Germany Fund. This country fund was subject to especially volatile swings in the winter of 1989-90 as the premium rose to 100%

after the fall of the Berlin Wall. Popular accounts of the episode attributed it to speculation on the part of individual investors, both American and Japanese, waiting to "cash in" on new investment opportunities in Germany. What made the behavior doubly impressive was that it seemed to carry a cross-border contagion. Between November 9 and January 26, the Austria (AUS), the First Iberian (FIB), the Italy (ITL), the Swiss (Helvetia) (SWH), and the far-flung Malaysia (MLY), Thai (THA), and Taiwan (TAW) funds experienced dramatic but short-lived increases (decreases) in the premium (discount).[4] Figure 2b suggests that the events of 1989 have not yet dissipated for the Germany Fund. Whereas the fund traded at a discount between 20% and 0% prior to November 1989, on a typical day following October 3, 1990, the fund traded at a premium.

Discounts contradict the value-additivity principle of efficient and frictionless capital markets. However, as Rozeff [1991] notes, truly frictionless markets do not exist. In efficient and frictionless markets, investment companies would not arise because they could not offer diversification services at a lower cost than zero, and no benefit could accrue to professional managers. Therefore, because the funds exist, they should be expected to trade at prices different than NAV. Intriguing issues, of course, relate to the *source* of the frictions and inefficiencies that give rise to the existence, persistence, and time-variation in discounts (Brauer [1992]).

The behavior of country fund discounts may reflect items that preclude costless cross-border transactions: official and unofficial barriers to capital movements, transaction costs, time mismatch in trading hours, or risk arising from the time required to complete a full arbitrage transaction. Barriers to capital movements, for example, could potentially explain the variability of the discount: in a segmented market, the price of a U.S.-based country fund is determined by the diversification needs of U.S. investors, whereas the NAV of the fund is determined by the diversification needs of the investors in the fund's host country. Put differently, the relevant (priced) systematic risks of the fund and its net assets are based on different benchmark portfolios in segmented markets. Weekly changes in the gap between price and net asset value could be generated by time variation in the difference between these risk measures.

Alternatively, discounts may be caused not by market frictions but rather by the mechanism of public trading. This explanation emphasizes the role of irrational investors, called "noise traders" or "ordinary Investors," who interact in the market with rational investors (Delong, Shleifer, Summers, and Waldman

(DSSW) [1990], Shiller [1984], Zweig [1973]). Lee, Shleiffer, and Thaler [1991], henceforth LST, evaluate empirically this explanation of the behavior of fund discounts using data on domestic-equity funds. An important feature of this model is the variation in the demand of noise traders caused by shifts in "sentiment" or by "misperceptions" of fundamental value. DSSW, for example, characterize sentiment as the excess of investor return expectations over the mathematical expectations. While variation in sentiment potentially explains variation in country fund discounts, DSSW add additional structure to their model by introducing the idea of noise-trader *risk*. If variation in investor sentiment or misperceptions on individual assets vary systematically, then assets subject to sentiment will be riskier and underpriced, on average, relative to fundamentals.

The first aim of the present paper is to characterize some basic empirical regularities of *country fund* prices. Owing to the recent emergence of country funds, relatively little empirical work has been conducted on their pricing; much of the evidence remains anecdotal. In contrast, there is a large empirical literature on the behavior of prices of domestic-equity funds. This paper fills the gap in the existing literature by examining the behavior of country fund prices. A second aim is to examine whether the sentiment model is consistent with closed-end fund pricing.[5] Accordingly, the paper relies on the noise-trader model to motivate and guide the empirical relationships that we examine using the country funds. The empirical regularities we uncover present a challenge to asset pricing models that assume investor rationality and market efficiency, but this challenge is left to future research.

Country funds have a number of distinct advantages over domestic-equity funds in determining the validity of models based on investor sentiment. First, country fund discounts are better suited to detect movements in sentiment than domestic-equity fund discounts. As noted by Chopra, Lee, Shleifer, and Thaler (1993), the discounts of domestic-equity funds may not fully capture swings in sentiment because the same U.S. investor sentiment affects both the price of the fund and its underlying assets, so that swings in investor sentiment leave the discount largely intact. U.S.-based country funds, on the other hand, may not suffer from this problem; while their prices would be subject to U.S. investor sentiment, prices of their underlying assets (which determine the NAV) will be determined largely on foreign equity markets, which, presumably, are not subject to U.S. investor sentiment. Variation in the discounts of the country funds would, therefore, reflect any

differences in sentiment between U.S. and foreign-based investors, resulting in both more volatility in discounts and greater statistical power.

Second, compared with domestic-equity closed-end funds, the co-movement of country fund discounts provides a stronger indication of common variation in sentiment than of common variation in fundamentals. The underlying assets of domestic-equity funds are U.S. stocks, and thus a large component of their prices or NAVs is due to common variation in U.S. fundamentals. On the other hand, the underlying assets of different country funds are equities of different countries, and thus common cross-country variation in fundamentals represents a much smaller fraction of the total variation in country fund discounts. Finding a strong common component in discounts across country funds is, therefore, more likely to be the result of common variation in U.S. investor sentiment than the result of common cross-country variation in fundamentals.

Finally, compared with domestic-equity funds, country funds enable us to analyze a richer array of factors that may potentially drive the movement of investor sentiment and misperceptions over time. Such factors can be changes in foreign exchange rates, host country stock prices, world stock prices, and U.S. stock prices.

The rest of the paper is organized as follows: Section I reviews the stylized facts regarding the pricing of publicly traded funds. The same section extends the model of DSSW in a multi-asset context. The predictions of the model subsequently serve as a heuristic guide for our empirical work. Section II discusses our data and its sources and provides some additional institutional facts about country funds. Section III focuses on the time-series behavior of country fund prices. Section IV explores the determinants of the returns on country funds. In particular, the section examines the response of the fund returns and discounts to financial variables such as foreign stock market returns, exchange rates, and U.S. stock returns. Section V summarizes our main conclusions.

I. The Closed-End Fund Puzzle and the Noise Trader Model

I.1 The Puzzle

Unlike an open-end mutual fund, the shares of a publicly-traded fund cannot be redeemed at net asset value and thus the link between the market value of the fund shares and the market value of the fund's NAV is tenuous. The "closed-end fund puzzle" refers to the finding that publicly-traded funds always trade either at a discount or at a premium to their respective NAVs. The empirical literature finds that discounts are the norm.[6]

The existence and persistence of discounts seems to contradict the value-additivity principle of frictionless efficient capital markets. Moreover, no generally accepted explanation for the existence of premia and discounts exists. Explanations of this puzzle consistent with market efficiency and frictionless capital markets emphasize that the fund's net asset value may be mismeasured. For example, the reported NAV does not correctly account for: management fees, illiquid "letter stock" in the portfolios, or the implicit capital-gains tax liability on unrealized price appreciation (see Bourdeaux [1973] and Roenfelt and Tuttle [1973]). However, the above sources of NAV mismeasurement can only partially explain the existence of persistent discounts on domestic- equity funds (Malkiel [1977], LST [1991]). Moreover, anecdotal evidence and academic research suggests that the mismeasurement hypotheses are unable to explain the variation in discounts across funds.[7]

In light of the problems in explaining the discounts, both generally and for country funds, Brauer [1992] stresses that further insights might be derived from research into the behavior of discounts through *time*. In this regard, LST summarize four stylized facts concerning the time-series properties of domestic-equity closed-end funds, which cannot be explained by the mismeasurement hypothesis.[8] LST assert that any theory purporting to explain the existence of discounts must also be consistent with the stylized facts. However, the standard explanations cannot, separately or together, explain the ancillary pieces of the puzzle represented by the stylized facts. LST demonstrate that the noise-trader model of DSSW is not only consistent with the stylized facts, but implies them as well. Using a sample of primarily domestic-equity funds, LST test those implications of the model which had not been derived or tested in the context of other theories of discounts.

I.2 A Model of Investor Sentiment

We now present a general multi-asset version of a model with both rational (informed) investors and noise traders in order to motivate the implications of the sentiment model for country fund data. Readers familiar with the intuitive predictions of the model may skip to Section II.

The economy contains one riskless asset, which earns a gross rate of return $1+r$, and K risky assets, which we interpret as equities. The risky assets are in *fixed* supply which we denote by the K-dimensional vector ι. The number of shares of each risky asset is normalized to equal one, so that ι is a vector of ones. We let $\mathbf{P}_t$ and $\mathbf{D}_t$ denote the K-dimensional vectors of the prices and dividends paid on the K risky assets, respectively. The j^{th} element of $\mathbf{P}_t$ and $\mathbf{D}_t$, represents the price and dividend of the j^{th} asset, respectively. As in DSSW [1990] and Shiller [1984], we postulate the existence two representative agents: a rational (informed) investor and an ordinary investor (noise trader). Informed investors are present in the market in measure $1-\mu$; noise traders are present in measure μ.

The informed agent chooses his portfolio to maximize his perceived expected utility given his own beliefs about the mean of the normally-distributed with-dividend price vector $(\mathbf{P}_{t+1} + \mathbf{D}_{t+1})$.

$$\lambda_t^I = \Omega_t^{-1}[E_t(\mathbf{P}_{t+1} + \mathbf{D}_{t+1}) - (1+r)\mathbf{P}_t]/\gamma \tag{1.1a}$$

Here λ_t^I is a K-dimensional vector representing the demand for shares by the informed investor, while Ω is the variance-covariance matrix of $(\mathbf{P}_{t+1} + \mathbf{D}_{t+1})$, and γ is the coefficient of absolute risk aversion. The *jth* element in λ_t^I represents the number of shares of risky asset j demanded by the representative informed agent.

Whereas informed agents respond only to expected returns optimally forecast, noise traders respond to another factor denoted by ρ_t. ρ_t is assumed to enter the demand of noise-traders in linear fashion and represents either an over- or under-reaction to news about fundamentals or represents a "fad". For now, we adopt DSSW's [1990] assumption that ρ_t captures the noise-trader's misperception of the expected with-dividend price vector of the risky assets. Specifically, the demand of the noise trader is given by:

(1.1b) $$\lambda_t^N = \Omega_t^{-1}[E_t(P_{t+1} + D_{t+1}) + \rho_t - (1+r)P_t]/\gamma.$$

That is, if the rational expectation of $P_{t+1} + D_{t+1}$ is given by $_t(P_{t+1} + D_{t+1})$, then the noise trader's expectation is given by $_t(P_{t+1} + D_{t+1}) + \rho_t$. The two investors' problems are similar except for the term ρ in (1.1b). When the noise trader is "bullish" on risky asset j, the j^{th} element of the vector ρ is large, and he will nominally demand more shares of that asset than the rational investor. The demand functions reflect a crucial assumption made by DSSW: that investors' horizons are short, so that they care only about their wealth, one period hence.[9]

Market clearing requires: $(1-\mu)\lambda_t^I + \mu\lambda_t^N = \iota$. Substituting the demand functions into the equilibrium condition yields required excess returns:

(1.2) $$E_t(R_{t+1}) = E_t(P_{t+1} + D_{t+1}) - (1+r)P_t = \gamma\Omega_t\iota - \mu\rho_t.$$

Equation (1.2) suggests that equilibrium returns are relatively high when noise-traders are bearish. In other words, ordinary investors systematically "mis-time" the market. The limit of (1.2) as the measure of noise traders, μ, goes to zero is the ordinary efficient markets model.

To derive useful closed-form solutions, we assume that both dividends and sentiment follow first-order auto-regressive processes. Thus, for any asset $j, j = 1,\ldots,K$, that earns dividends or is subject to sentiment:

(1.3) $$d_{j,t+1} = \phi_j d_{j,t} + v_{j,t+1} \;;\; v_{j,t+1} = z^d_{t+1} + \varepsilon^d_{j,t+1}$$

$$\rho_{j,t+1} = \Psi_j \rho_{j,t} + u_{j,t+1} \;;\; u_{j,t+1} = z^\rho_{t+1} + \varepsilon^\rho_{j,t+1}$$

The disturbance terms, v and u, are assumed to be normally-distributed, white noise processes. Each error term contains two components. The systematic component, denoted by z^d for fundamentals, and by z^ρ for sentiment, is a white noise, normally distributed shock common to all assets. z^d and z^ρ may be correlated contemporaneously. The idiosyncratic terms, denoted by ε^d for fundamentals and by ε^ρ for sentiment, are white noise, normally-distributed errors that are contemporaneously uncorrelated across assets and between sentiment

and fundamentals. Equations (1.3) embody DSSW's assumption that noise traders' sentiment is stochastic and cannot be perfectly forecasted by rational investors. Closed-form steady-state solutions for prices and expected returns on any risky asset j are given by:

(1.4a)

$$p_{j,t} = \frac{\beta\phi_j}{1-\beta\phi_j} d_{j,t} + \frac{\beta}{1-\beta\psi_j}\mu\rho_{j,t} - \frac{\gamma}{1-\beta\phi_j}\left(\frac{\sigma_{v_j,W}}{r}\right) - \frac{\gamma\beta}{1-\beta\psi_j}\left(\frac{\sigma_{u_j,W}}{r}\right)$$

(b)

$$E_t(R_{j,t-1}) = \gamma\sigma_{R_j,W} - \mu\rho_{j,t} = \frac{\gamma\beta\phi_j}{1-\beta\phi_j}\sigma_{v_j,W} + \frac{\gamma\beta\psi_j}{1-\beta\psi_j}\sigma_{u_j,W} - \mu\rho_{j,t}$$

where the σ terms represent the steady-state covariances of the error terms from (1.3) with aggregate wealth W, where $W = \Sigma^K_{k=1}(p_k+d_k)$; and $\beta = (1+r)^{-1}$.

If variation in sentiment for asset j is not idiosyncratic, but instead reflects systematic variation in noise trader sentiment which affects other assets, or is positively correlated with innovations in fundamentals, then the covariance term $\sigma_{u_j,W}$ in (1.4a,b) will be positive. By raising systematic risk, variation in noise trader sentiment lowers the price of the risky asset j, and correspondingly raises the expected return. Note that the expected return on asset j will be higher even if noise traders are neither *currently* bullish nor bearish ($\rho_{j,t} = 0$), because the systematic risk attached to noise trader activity in asset j remains.

The second terms in (1.4a,b) capture the "price pressure" effect of sentiment on prices. As soon as fundamental (or non-fundamental) news gives rise to an increase in sentiment, the price of the stock will jump to reflect not only what rational investors think the announcement means for future dividends but also what they think the announcement means for current and future demand by ordinary investors. From (1.4b), the model has the property that any variables dated t or earlier which are known to reflect current noise-trader sentiment will also help predict returns.

I.3 Fund Discounts and The Noise Trader Model

A crucial assumption needed to apply the sentiment model to the pricing of publicly-traded funds is that publicly-traded funds and their underlying assets are not subject to the same variation in noise trader sentiment. One way to rationalize this is to assume that the fund and its underlying assets have different investor clienteles, and that one clientele is subject to swings in sentiment and misperceptions while the other is not. In the context of the model presented above, we can think of assets not subject to noise-trader sentiment as falling within a non-trivial subset of all risky assets, call it K', where $K' \subset K$. Now consider a risky asset $j' \in K'$, whose dividend stream is identical to the dividend stream of another risky asset $j \in K\text{-}K'$, but, being in K' is not subject to sentiment. Assuming that the fund itself is subject to noise-trader sentiment, but the underlying assets are not, we can think of asset j as a stylized publicly-traded fund, and asset j' as the fund's underlying portfolio. From (1.4) we derive the price of j' as:

(1.5)

$$p_{j,t} = \frac{\beta o_j}{1-\beta o_j} d_{j,t} - \frac{\gamma}{1-\beta o_j}\left(\frac{\sigma_{\varepsilon,w}}{r}\right)$$

Subtracting $p'_{j,t}$ from $p_{j,t}$ yields an expression for the discount:

(1.6)

$$p'_{j,t} - p_{j,t} = \frac{\gamma\beta}{1-\beta\psi_j}\left(\frac{\sigma_{\varepsilon,w}}{r}\right) - \frac{\beta}{1-\beta\psi_j}\mu\rho_{j,t}$$

Taking the unconditional mean we are able to express the average discount:

(1.7)

$$\overline{p'_j - p_j} = \frac{\gamma\beta}{1-\beta\psi_j}\left(\frac{\sigma_{\varepsilon,w}}{r}\right)$$

Equations 1.6 and 1.7 embody an "answer" to the closed-end fund puzzle: discounts will vary inversely with sentiment. Assuming that the underlying assets of the fund are not subject to the same variation in sentiment, the discount on the fund will shrink when noise traders are bullish on the fund. If the innovation in noise-trader sentiment covaries positively with the innovation in total wealth, the covariance terms in equations 1.6 and 1.7 will be positive. Thus, discounts on the fund may prevail even when noise traders are neither currently bearish nor bullish. In section III.1 below, we examine the average discount of country funds.

Because sentiment is not directly observable, the sentiment model per se does not generally establish any readily testable implications. However, in the context of publicly-traded fund pricing, the difference between the price of a fund and its NAV can serve as this proxy. Equation (1.6) suggests that the sentiment attached to each fund j will be perfectly correlated with its discount. Under the hypothesis that sentiment is attached only to the price of the fund, any testable implication that applies to the level of sentiment equally applies to the discount. With this in mind, one implication can be derived from rearranging (1.6) and substituting into (1.4b):

(1.8)

$$E_t(R_{j,t+1}) = \gamma\sigma_{R,W} - \gamma\frac{\sigma_{\varepsilon,W}}{r} + \frac{1-\beta\psi_j}{\beta}\left(p'_{j,t} - p_{j,t}\right)$$

The expected return on the fund is a function of its discount. The relationship is positive, so long as Ψ_j is less than one, i.e., as long as sentiment is mean-reverting. If sentiment for a fund drives the discount, then the discount will predict future risk-adjusted returns. These issues are examined in sections III.2 and III.3, below.

The difference in the unconditional variance of the fund and the net asset returns is given by

$$Var(R_j) - Var(R'_j) = \left[\frac{\beta}{1-\beta\psi_j}\right]^2\sigma^2_{\varepsilon,} + \left[\frac{1}{1-\beta\psi_j}\right]\left[\frac{\beta}{1-\psi_j}\right]\sigma_{\varepsilon,v,}$$

The model predicts that the fund will exhibit more variability than the underlying assets so long as the shock to fundamentals does not covary excessively negatively with the shock to investor sentiment. We look at this in section III.4.

From (1.4a), the innovation in wealth is given as a weighted average of the innovations to fundamentals

and sentiment:

(1.9)

$$W_t - E_{t-1}W_t = [(P_t + D_t) - E_{t-1}(P_t + D_t)] \; t \; = \sum_{k \in K} \frac{1}{1-\beta\phi_k} v_{kt} + \sum_{k \in K} \frac{\beta}{1-\beta\psi_k} u_{kt}$$

Using (1.9), we can express the covariance term in (1.6) as:

(1.10)

$$\sigma_{R,W} = \left(\sum_{k \in K} \frac{1}{1-\beta\phi_k} \sigma_{z,z} \right) + \left(\sum_{k \in K'} \frac{\beta}{1-\beta\psi_k} \sigma^2_{z} \right) + \left(\frac{1}{1-\beta\phi_j}\right)^2 \sigma^2_{\epsilon} + \left(\frac{\beta}{1-\beta\psi_j}\right)^2 \sigma^2_{\epsilon}$$

For the sentiment attached to any risky asset j to covary appreciably with wealth when K is large, one of two conditions must be imposed on the behavior of noise-traders. Specifically, either some component of the innovation in noise-trader sentiment on fund j covaries with the systematic variation in fundamentals, so that the first term in (1.10) is non-trivial; or the set of assets subject to common variation in noise-trader sentiment, K', is large relative to K, so that the second term in equation (1.10) is non-trivial. Since publicly-traded funds make up a small portion of all risky assets, for the second condition to hold, the systematic component in the innovation in sentiment must also be present in other risky assets besides being present in the funds. These two conditions lead to testable implications. First, the innovations in the discounts on funds will be correlated with innovations in the systematic component of fundamentals. Second, the innovations in the discounts of country funds will share a common component across the funds. Third, there will be other risky assets, besides the funds, whose prices rise independently of fundamentals when discounts on the funds narrow. A natural candidate for such an asset is one whose clientele is the same as the funds. We examine these issues in sections III.5 and IV.1.

A specification for the innovations in fund discounts can be derived using the difference in returns between the fund and the net assets:

$$R_{j,t-1} - R'_{j,t-1} = (\sigma_{R,W} - \sigma_{R',W}) - \mu\rho_{j,t} + \frac{\beta}{1-\beta\psi_j} u_{j,t-1}$$

Equation (1.11) says that the difference in realized returns between the fund and the net assets is due to shocks to investor sentiment. Equation (1.11) is a useful analytic tool in the context of the model because it implies that any variables which help to explain (are correlated with) the contemporaneous difference between the return on the fund and its assets, *after controlling for the predictive power of the discount*, will be variables correlated with either idiosyncratic or systematic variation in noise-trader misperceptions. Empirical versions of equation (1.11) are examined in section IV.2.

II. Sample Data and Variable Definitions

II.1 The Sample

The country funds used in our empirical work consist of the 35 single-country publicly-traded funds which were covered in *Barron's* publicly-traded funds column from January 1985 through January 1993 inclusive, and for which at least nine months of price data exists within that period. Table 1 provides the names of the country funds along with the date of their respective IPOs. Table 2 presents some summary statistics on the sample of country funds, and compares them with similar statistics for a sample of publicly-traded domestic-equity funds, as well as a random sample of firms with market capitalizations comparable to that of the country funds. The sample of domestic-equity funds is taken from the list of "general equity funds" in *Barron's*. It includes the oldest and most well-known domestic-equity funds. The samples of operating firms are random samples drawn from the third and fourth market-capitalization quintiles of firms in *Standard & Poor's Industrial Compustat* Tape (the first quintile being the smallest firms).

The market capitalization of the country funds is on average smaller than that of the domestic-equity funds. This reflects, possibly, the older average age of the domestic-equity funds. Institutional ownership, measured as the fraction of shares owned by institutions, is smaller for the domestic-equity funds than for the country funds. However, both types of funds have much lower institutional ownership than operating firms with comparable levels of market capitalization. A common explanation for the lower participation of institutions in

publicly-traded funds is that institutional portfolio managers would rather not have to worry about justifying why they hold another managed fund and thus incur two management fees, one implicit and the other explicit. Table 2 suggests that individual investors are the clientele of country funds.

One difference between country funds and domestic-equity funds is that country funds may invest in stock markets which otherwise restrict international investment.[10] A government contemplating opening its markets to U.S. investors may choose to admit a U.S.-based country fund as a means of limiting such an opening to professional managers buying a fixed amount of shares. Typically, a fund is admitted prior to, or instead of, the introduction of ADRs or a full opening. Table 2 shows that country funds investing in unrestricted foreign markets tend to have smaller institutional ownership than funds investing in countries that restrict international investment in their respective equity markets.[11] Apparently, an institution can justify investing in particular foreign markets, and incurring an additional management fee, if the country fund is the only avenue by which such diversification is possible.

II.2 Variable Definitions

Weekly data on price and reported NAV of the funds was collected from *Barron's* and the funds themselves.[12] With the exception of the India Growth Fund (ING), which is excluded from the regressions in the empirical sections below, a complete time series of NAVs was obtained for each of the 35 funds. *Barron's* reports either the Friday or Thursday closing price in New York. The funds compute their reported NAVs by translating the local currency price of the assets at the local market close int U.S. dollars. The translation to dollars, however, is not uniform as some funds use the exchange rate at the local market close, whereas others use an afternoon fix in New York. Since foreign markets close on a given day prior to the close in New York, prices and NAVs will only be approximately synchronous. Constructed financial returns were adjusted for splits and in-kind distributions using the data in *Standard and Poor's Dividend Record*.[13] Table 3 provides a description of the variables used in the later empirical analysis.

We compute fund i's "discount" as the natural logarithm of the ratio of the fund's net asset value per

share (NAV) to its price per share (FND). Specifically,

$$DISC_{i,t} = \ln(NAV_{i,t}/FND_{i,t}).$$

The continuously compounded return on the fund itself, $RFND_{i,t+1}$, and on the net assets of the fund, $RNAV_{i,t+1}$, are defined as follows:

$$RFND_{i,t+1} = \ln\left(\frac{FND_{i,t+1} + DST_{i,t+1}}{FND_{i,t}}\right), \quad RNAV_{i,t+1} = \ln\left(\frac{NAV_{i,t+1} + DST_{i,t+1}}{NAV_{i,t}}\right)$$

where $FND_{i,t+1}$ and $NAV_{i,t+1}$ are the price and the net asset value (per share) of the i^{th} fund at the end of week $t+1$; and $DST_{i,t+1}$ is the distribution during week $t+1$, assumed to take place at the end of the week. Cumulative returns for horizons of four and thirteen weeks are defined by adding the individual weekly returns over the relevant horizons.

Observe that if the dividend distribution is zero or very small, the change in the discount, $\Delta DISC_{i,t+1} = DISC_{i,t+1} - DISC_{i,t}$, reflects the difference between the continuously compounded weekly return on net assets, $RNAV$, and the continuously compounded weekly return on the fund itself, $RFND$: $\Delta DISC_{i,t+1} = RNAV_{i,t+1} - RFND_{i,t+1}$.

III. The Time-Series Behavior of the Discount

This section investigates the time-series behavior of the discount or premium on country funds. We begin with an examination of the average discount over the full sample, as well as its behavior during the first six months after the initial public offering of the fund. We continue with standard non-stationarity tests of country fund discounts, which lead us to examine the predictive power of the discounts. Finally, we present evidence that, consistent with the predictions of the noise trading model, a large fraction of the variation in

individual country fund discounts is common across the funds.

III.1 Average Discounts and Aftermarket Performance of Country Funds

The first column of Table 4 presents the cross-sectional average of time-series means of the discount of all 35 funds over the sample period. Although the average discount is not significantly different than zero, separating the funds into those pertaining to countries with *restricted* and *unrestricted* equity markets reveals a difference between the two groups. The average discount on funds whose host markets are unrestricted is almost seven percent and significantly different than zero (t-statistic = 3.53), while the average discount on funds associated with restricted host markets is not significant. This evidence is consistent with theoretical models illustrating that international investment barriers can cause prices of assets of equal risk to differ across countries. All else equal, a binding restriction will raise the price-NAV ratio above the level prevailing in the absence of such restrictions (Errunza and Losq [1985], Eun and Janakiramanan [1986]).[14]

Table 4 also examines the *aftermarket performance* of the country funds relative to their underlying assets. One prediction of the noise-trading model is that a new fund will be issued only when sentiment for the fund is high. After an IPO, the fund's organizers invest the proceeds, net of underwriting fees, in accordance with the fund's investment objective. Because the amount of the offering exceeds the proceeds which constitute the initial NAV of the fund, the fund is issued at a premium. This premium is a derivative of the underwriting fees and start-up costs. A successful offering implies that some investors are willing to pay a premium for the cash that the fund is holding after the offering. The fact that some investors are willing to pay a premium can also be taken as evidence of bullish noise-trader sentiment for a country. Naturally, organizers will try to time issuance to coincide with this bullishness. If the noise-trading story is true and sentiment is mean-reverting, following an IPO the original high premium ought to deteriorate. A deterioration would occur even if, with cross-border restrictions, the average discount is small or if on average a premium prevails. Table 4 confirms these predictions.

Table 4 shows that country funds are issued with an underwriter's premium of about 7.5 percent.

Market premia appear to be larger, however. Our first NAV data are available on average about two weeks after the IPO. They show that funds associated with restricted markets trade, at that time, at premia of almost 25%, whereas funds associated with unrestricted markets trade at a premium of roughly 7.4%. Following the first price-NAV observation, the premia begin to erode. After 24 weeks, the premium on restricted funds falls to 6.8% from the original 24.4%, and the premium on unrestricted funds becomes -13.9% (a discount) from the original 7.4%. Recall that the change in the premium can be approximately interpreted as the difference between the cumulative returns on the fund and on the NAV. Accordingly, investors who buy a *unrestricted* country's fund in the immediate aftermarket and sell it 24 weeks later experience a negative return of 21.3% relative to NAV, while holders of a *restricted* country's fund experience a loss of 17.6% relative to NAV. Assuming cross-sectional independence, both of these average cumulative returns are significantly different than zero. Moreover, a non-parametric U-test does not reject the hypothesis that the average 24-week returns are the same across the two groups of funds.[13] Finally, the last column of Table 4 shows that if the first twenty-four weeks are omitted from each fund's time series, the average discount for the full sample is almost 6% and significant, while the average discount for the unrestricted sample is 9% and also significant. The evidence presented in Table 4 suggests that after taking account of the effects of cross-border restrictions, the aftermarket performance of country funds adheres to the stylized facts derived for the domestic equity funds: in the long run a discount prevails.

III.2 Stationarity Tests

If all publicly-traded funds are ultimately liquidated, discounts are in the long run stationary. Over short time intervals, however, discounts could be non-stationary. Discount stationarity is relevant in the context of the noise trader model because the discount reflects the sentiment attached to a particular country fund. If sentiment is mean-reverting, and variation in sentiment drives the discount, then discounts should also be mean-reverting. Alternatively, if under cross-border segmentation, variation in discounts is driven by changes in the ratio of the domestic price of risk to the foreign price of risk, then the price of a fund might have no inherent tendency to

revert to the market price of the underlying assets, and the discount could be non-stationary.

To test the hypothesis of non-stationarity, we employ Stock and Watson's [1988] unit root test twice, for the model with and without a time trend. We also perform the test using either one or eight autoregressive lags. Table 5 presents the results. The hypothesis of non-stationarity is rejected for most of the country funds. When the number of autoregressive lags is one, the hypothesis is rejected at the 10% level for 23 funds in the model with a time trend, and for 23 funds in the model without a time trend. When the number of autoregressive lags is eight, the hypothesis was rejected for 20 funds in the model with a time trend, and for 16 funds in the model without. Assuming independence across the funds, and using the normal approximation to the binomial distribution, one can compute the probability that the above results were generated under the null hypothesis that all fund discounts are non-stationary. In all four cases, rejections occur at the 1% significance level.

In some funds, the hypothesis of non-stationarity is not rejected. In these exceptional cases, however, changes in the ratio of foreign to domestic price of risk in the context of cross-border investment restrictions are unlikely to be responsible for the failure to reject non-stationarity. Examination of Table 5 reveals no special pattern across the restricted and unrestricted funds. The Emerging Mexico (EMG), First Philippine (FPH), Indonesia (IND), Mexico (MEX), Mexico Income and Equity (MEI), Taiwan (TAW), ROC Taiwan (ROC), Thai (THA), and Thai Capital (THC) funds generally reject non-stationarity of discounts even though they are associated with restricted capital markets. Meanwhile, the Austria (AUS), Japan OTC (JPO), Singapore (SNG), and Spain (SPN) funds fail to reject non-stationarity even though they invest in largely unrestricted markets.

The median first-order autoregressive coefficient across the 35 discounts of the country funds is 0.887, implying that an innovation in the discount has a half-life of roughly five weeks. Similarly, the average correlation between consecutive weekly discounts is approximately 0.854, implying that the first-order autoregressive process can explain about 73% of discount variation. The correlation at four weeks is 0.57 (R^2 = 0.32), and is substantially less than the one-month correlation (0.85) found by Pontiff [1991] using LST's domestic-equity fund data.

III.3 Do Fund Returns Vary Excessively?

Sharpe and Sosin [1975], using quarterly data from 1966 to 1973 on eight domestic funds, find that the unconditional variance of the median fund's return is 36% greater than the variance of its net asset value return. Pontiff [1991], using LST's data set finds that return volatility is 73% greater than the volatility of the fund's assets. The relative variance of returns on the funds is important because it addresses the issue of excess volatility that noise traders, through the mechanism of public trading, may induce in the prices of traded assets. The fund's return is excessively volatile if $\mathrm{Var}(RFND) > \mathrm{Var}(RNAV)$, or $\mathrm{Var}(\Delta DISC) - 2\mathrm{Cov}(\Delta DISC, RNAV) > 0$. Following Pontiff [1991], to reduce skewness, we computed the log variance ratio on each of the 35 country funds as the natural log of the ratio of the variance of the fund's return to the variance of the return on its assets. This ratio will be zero if the variance of a fund's return is equal to the variance of its NAV return. For our sample of funds we found the mean log variance to be 1.17 (s.e. = 0.57). The median ratio is 1.135, implying that for the median fund (UKF), the variance of its return is more than three times greater than the variance of its nets asset return. It is unlikely that a variance ratio of this magnitude could be attributable to bias in the variance estimates deriving from bid-ask spread bias.

III.4 The Predictive Power of Discounts

Mean reversion in the discounts, as demonstrated above, implies that the discount of a given country fund can predict a subsequent change in the discount. Moreover, since the change in a discount reflects (approximately) the difference between the returns on the fund and its assets, a larger premium predicts either: 1) a smaller subsequent cumulative return on the fund, or 2) a larger cumulative return on the fund's assets, or 3) both a smaller return on the fund and a larger return on the NAV. In the context of the noise-trader model, the first case occurs when sentiment affects only the *price* of the fund, and the fund premium is perfectly positively correlated with that sentiment. In the second case, sentiment affects only the underlying assets, and the premium on the fund price is perfectly negatively correlated with that sentiment. In the third case, both the fund and the

underlying assets are subject to sentiment, and the discount is a noisy measure of both sentiment on the fund and sentiment on the underlying assets. Thus, although from the level of the discount, we can only infer the differential in sentiment between the country-fund and foreign-market clienteles, the power of the discount in predicting fund returns (relative to its predictive power for the NAV returns) can be taken as an indication of the extent to which sentiment affects only the fund price.

The empirical literature on domestic-equity funds upholds that deep discounts are indicative of positive risk-adjusted returns.[16] Although this empirical relation is well-established for domestic-equity funds and has become popularized (Malkiel [1990], Fredman and Scott [1992]), to our knowledge no one has examined these empirical relations for country funds.[17] To examine the predictive power of country fund discounts we ran regressions of the form:

(3.1)

$$\sum_{n=1}^{N} RFND_{i,n} = \alpha^{f}_{i} + \beta^{f}_{i} DISC_{i,t} + e^{f}_{i,t}$$

$$\sum_{n=1}^{N} RNAV_{i,n} = \alpha^{a}_{i} + \beta^{a}_{i} DISC_{i,t} + e^{a}_{i,t}$$

where the α_i and β_i are fund-specific intercepts and slope coefficients and N denotes the cumulative return horizon. In Table 6, we report the estimates of β^{f}_{i} and β^{a}_{i}, as well as the adjusted-R^2, for regressions using cumulative return horizons of 1, 4, and 13 weeks. Panel A in Table 6 shows that an increase in the discount is generally associated with a subsequent increase in the fund's return. As the return horizon increases from one week to thirteen weeks, the reversal in the fund price becomes progressively stronger, generating a larger regression coefficient between the cumulative return on the fund and the discount. Evidently, bid-ask bias or other measurement errors cannot account for the price reversal.[18] The average adjusted-R^2s of the regressions are 0.053 for the one-week return horizon, 0.106 for the four-week horizon, and 0.179 for the thirteen-week horizon. The strong predictability of fund returns supports the hypothesis that sentiment is a component of the price of the fund.

High discounts are less successful at predicting low NAV returns. Few regression coefficients are

negative and significant in Panel B of Table 6 and the R^2s are much lower, on average, than in Panel A. The average adjusted-R^2s are 0.007, 0.031, and 0.084 for the one-, four-, and thirteen-week horizons, respectively. Nonetheless, most regression coefficients in Panel B are negative, and in five funds (AUS,IND,JKG,ROC,TAW) the regression coefficients are generally negative and significant. Occasionally, therefore, discounts contain some information about future net asset value returns, implying that a small component of the discount reflects the sentiment of foreign investors which affects the price of the underlying assets. That is, the price of the fund captures fundamental information not captured by the NAV.

III.5 Is There a Common Component in Country Fund Discounts?

So far, we have analyzed individual country funds in isolation. We now examine comovement in country fund discounts. The noise-trader model suggests that persistent discounts across country funds imply that fund discounts may be subject to a common (systematic) source of risk. If U.S. investors act on general bullish and bearish sentiment which affects all country funds, their behavior is likely to affect country fund prices systematically, resulting in a common component across the fund discounts.[19]

To capture a possible common component across the fund discounts, we estimate a parametric version of the "single index" models discussed by Sargent and Sims [1977]. Estimation of the unobserved component model provides a succinct test of the presence of a common component across funds as well as a convenient tool for analysis. The empirical model is as follows. Each discount $DISC_{i,t}$ is hypothesized to move contemporaneously with an unobserved scalar ("index"), Z_t, which is common to all funds, and an idiosyncratic component $\varepsilon_{i,t}$. Both the unobserved index and the idiosyncratic component of each fund's discount are modelled as having linear stochastic structures. In addition, Z_t is assumed to only enter each fund's discount contemporaneously. The formulation is:

(3.2)
$$DISC_{i,t} = B_i Z_t + u_{i,t} ;$$
$$\alpha(L) Z_t = e_t ; \delta_i(L)\, u_{i,t} = v_{i,t} ; i = 1,\ldots,K$$

where $\alpha(L)$ and $\delta(L)$ are polynomials in the lag operator L, e_t and v_t are white noise errors, and K represents the number of assets. The main identifying assumption of the model expresses the notion that co-movements in the multiple discounts arise from a single source Z_t. This is formalized by assuming that the terms $u_{i,t}$, $i = 1,...,K$, and the term Z are mutually uncorrelated at all leads and lags.

Because estimation of the model requires exactly overlapping time-series of fund discounts, we choose the estimation period in order to balance the need for a long weekly time series and the need to include many and diverse funds. We restricted the sample to include the nine oldest funds (MEX, FAS, GER, SWH, ITL, KOR, MLY, TAW, and UKF) over the period January 1988 to January 1993. We estimate the model by first casting it into a (vector) state-space form and then applying the Kalman filter to evaluate the likelihood function.[20] To simplify estimation, we further assume that $\alpha(L)$ and $\delta(L)$ represent first-order polynomials. In addition, we normalize the variance of the innovation in the common factor, v_t, to equal 1.[21]

The results from estimating the unobserved components model are given in Table 7, Panel A. Several features are worth noting. First, seven of the nine slope coefficients, B_i, that relate the common factor to the discount of each country fund, are significant, while two are marginally significant. Furthermore, the estimate of the autoregressive coefficient of the common component, α, is 0.96 (s.e. = 0.03). This implies a level of persistence of the common component (half-life = 17 weeks) considerably greater than the persistence of the idiosyncratic components implied by the estimates of the δ, whose median value is 0.78 (half-life = 3 weeks). A likelihood ratio test of the hypothesis that there is no common factor, i.e., that the B_i and α are all jointly zero, strongly rejects: $\chi^2(10) = 131.4$; p-value = 0.00. Based on the estimates of the slope coefficients (B_i), the estimates of the autoregressive parameters (α and δ_i), and the estimates of the variances of the idiosyncratic errors, we computed for each of the nine funds the fraction of the unconditional variance of the discount attributable to the common factor. We found that on average, the variance in the common factor accounts for roughly 20% of the variance in the discounts (last column, Panel A).

Inspection of the errors generated by the model estimated above reveals serial correlation in the residuals. In other words, specifying AR(1) processes for the common and idiosyncratic components is not general enough to fully capture the dynamic behavior of discounts. Checking the robustness of our results to a

higher-order dynamic specification could be done, in principle, by allowing more lags in the factor dynamics. However, this turns out to be computationally costly. Instead, we applied the Kalman filter to pre-whitened discounts for the nine country funds under consideration and tested for a common component in the *innovation* in the country fund discounts. Formally, we replaced $DISC_{i,t}$ in the formulation above, with $A_i(L)DISC_{i,t}$ (for i = 1,....,K) and forced the Z_t and $u_{i,t}$ to be white noise. $A_i(L)$ is a polynomial in the lag operator which "whitens" the discounts.[22]

Results from estimating the model using the pre-whitened data are in Panel B of Table 8. The estimates of the B_i, the exposure of the fund discounts to the common innovation, are now highly significant for all nine funds. The likelihood ratio test of the hypothesis that there is no common disturbance strongly rejects ($\chi^2(9)$ = 140.6; p-value = 0.00), and simple diagnostic tests on the errors generated by the model reveal no evidence of serial correlation. The average estimate of the contribution of the common factor to the variances of the country fund discounts remains roughly 17%. Overall, the results presented in Table 7 provide strong evidence of common variation across the fund discounts.

Further insight into the results can be gained by examining the behavior of the unobservable common factor during the sample period. A plot of Z_t, generated from the first model, is presented in Figure 3. Because the variance of the innovation in Z_t is normalized to 1, the reader should focus on relative changes instead of the level. The most noticeable feature of the common factor is its behavior in late 1989 which coincides with the fall of the Berlin Wall.[23] Although the noise-trader model does not explicitly specify any one source of investor misperception or sentiment, Shiller [1984] discusses one characterization of sentiment as a change in investors' attitude toward future returns which may occur as an arbitrary social reaction to some widely noted events. In the introduction, we noted that the fall of the Berlin Wall might qualify as such an event. The analysis of this sub-section seems to confirm that the event was associated with an innovation in the unobserved common component in the discount across the country funds. Compared with the sentiment model, initial public offerings of country funds shown in Figure 1 peaked in 1990.[24]

IV. Sources of Variation in Country Fund Discounts

Although widely noted events may account for some large coherent swings in sentiment, casual observation suggests that they cannot account for all of the variation in the discounts of country funds. In this section we examine the response of fund prices to specific aggregate financial variables such as the exchange rate, the index of the host country's stock prices, an index of world stock prices, and indices of stock prices for large- and small-capitalization U.S. firms. Our aim is to explore potential sources of the variation in fund discounts that we documented in earlier sections, and to examine whether or not the noise trader model can accommodate some of the evidence we uncover. In order to shed some light on the ability of models with rational agents and investment restrictions to explain the time-variation in discounts, we also perform the empirical analysis separately for funds whose host countries restrict international investment from funds whose host countries allow free capital movements. We also examine the differences between host countries with developed stock markets and those with emerging stock markets and between Asian, European, and Latin American funds.

IV.1 Specification

For each country fund i we estimate basic regression equations of the form:

(4.1)

$$\sum_{n=1}^{N} RET_{i,t-n} = \beta_0 + \beta_1 DISC_{i,t} + \sum_{j=2}^{J} \beta_j \left(\sum_{n=1}^{N} X_{j,t-n}\right) + e_{i,t-n}$$

where *RET* denotes alternatively the weekly return on the country fund, *RFND*, the weekly return on the NAV, *RNAV*, and the excess return on the country fund, *RFND-RNAV*. *DISC* is the country fund discount, and is observed at the beginning of the holding period prior to the realization of the cumulative return ΣRET. Hence, the equation is an extension of the earlier forecasting equations of Section III. The X_js are weekly returns of

different financial variables observed simultaneously with the dependent variable. N denotes the holding period horizon in weeks. As before, we show results for N = 1,4, and 13 weeks.

When the dependent variable is *RFND-RNAV*, the above equation becomes the empirical counterpart of equation (1.11) of the sentiment model. In this framework, DISC captures the level of sentiment in the beginning of the holding period, while the remaining independent variables capture the influence of innovations in sentiment during the holding period. Being financial rates of return, the X_j variables are nearly serially uncorrelated and thus may readily capture *innovations* in sentiment.

The first financial variable that we use as an explanatory variable in the regression is fund-specific and represents the cumulative return on a broad index of stocks from fund *i*'s host country, *RFST*. *RFST* is included to capture the component of returns that are attributed to *local currency* variation in the host country's stock market. The second variable, *REX*, is the weekly dollar return on holding the foreign country's currency. Changes in the value of the dollar relative to the foreign currency result in an unambiguous change in the dollar value of the fundamental. While small exchange rate movements that are perceived by the market as temporary may not affect the fund price and thus may move the discount/premium, large changes in the dollar value of foreign currency ought to move the price of the fund sufficiently in order to leave the discount/premium unaffected. Nonetheless, casual observation of the event of September 1992 suggest otherwise. This month saw an appreciation of the dollar as speculators bet against certain weak European currencies in anticipation of the withdrawals from the ERM which did occur. The resultant appreciation of the dollar was associated with significant drops in the premia of the European country funds: as the NAV (translated to dollars) fell, the price of the funds generally did not.

Our earlier empirical analysis showed that country fund discounts shared a common component. We now include three explanatory variables that are common to all country funds in order to capture some of this common variation. The first of these variables, *RWRD*, is the dollar return on a world stock market index. The next variable, *RSP*, is the dollar return on an index of large U.S. stocks. The last variable *RSML - RSP*, represents the excess return on an index of small-capitalization U.S. stocks over the return on the large stocks. Under LST's [1991] assertion that noise trader sentiment is associated with individual investors, and thus largely

affects small-cap stocks, an index of large U.S. stocks is more apt to capture variation in U.S. fundamentals, while the excess return on small caps will capture variation in noise trader sentiment. Detailed definitions of all variables are given in Table 3.

IV.2 Results

Table 8a presents the main results. In order to abstract from unnecessary details, the table presents only summary results for all funds from stacked regressions. The stacked regressions restrict the slope coefficients to be the same across funds but allow individual fund intercepts. In addition to the multivariate regression described above, Table 8a also provides results from univariate regressions in which the cumulative returns $\Sigma RFND$, $\Sigma RNAV$, and $\Sigma RFND$-$\Sigma RNAV$ are regressed on each of the independent variables separately. Panel A reports the results for the 1-week holding-period horizon, Panel B the 4-week horizon, and Panel C the 13-week horizon.[25]

The fund discount has strong explanatory power for fund returns (ΣRFND) in both the multivariate and univariate regressions. As already noted in the earlier sections, high discounts are associated with positive future returns on the fund but negative future returns on the net assets. As a result, the association with excess fund returns, $\Sigma RFND$-$\Sigma RNAV$, is even stronger. Observe also that as the holding period horizon increases the absolute size of the β_i coefficients also increases. There is strong reversion of the fund price toward the NAV, as well as a smaller but statistically significant reversion of the NAV toward the fund price. A relative fall of the fund price -- that is, an increase in the discount -- by 100 basis points is followed by an increase in the fund price and a decrease in the NAV. The multivariate regression shows that after 13 weeks, the fund price has increased by 37.5 basis points and the NAV has fallen by 6.4 basis points, thus 44 of the original 100 basis points gap have been eliminated.

Turning to the response of country fund prices to local stock returns, $\Sigma RFST$, country fund returns themselves have significantly lower betas that do the NAV returns. The average local market beta for the NAV return (fund return) is 0.608 (0.428) for the 1-week return horizon and 0.718 (0.600) for the 13-week horizon.[26]

These observed differences between the fund and NAV are significant at each horizon although the magnitude of the difference decreases with the return horizon. Country fund prices are apparently sticky with respect to movements in the host country's stock market.

A similar stickiness is observed in the response of country fund prices to movements in the exchange rate. In the one-week horizon, fund prices show practically no reaction to changes in the exchange rate, when at the same time the NAV shows a strong response: the fund return has a beta with *REX* of 0.088, while the NAV has a beta of 0.621.[27] The difference between the fund beta and NAV beta weakens at longer holding horizons. As the horizon increases, fund price becomes statistically indistinguishable from the response of the NAV to *ΣREX*.

Consistent with both the excess volatility of fund returns and the existence of a strong common component among fund discounts, Table 8a shows that the fund returns are excessively sensitive to all three financial returns that are common across the different country funds. In the multivariate regressions, fund returns have significantly higher betas with respect to the world stock index return (*RWRD*) than NAV returns at every holding-period horizon.[28] In the univariate regression as well, we find that the beta of the fund with respect to the world index is significantly larger than the beta of the NAV with the same world index, and that this difference is not affected by the return horizon. Thus, if the world index were the appropriate benchmark for measuring wealth, the result suggests that the country funds are systematically riskier than the underlying assets.

Excess sensitivity is also present in the response to U.S. stock returns.[29] For the one-week holding-period return, fund return betas with respect to *RSP*, the large-firm return index, are positive and statistically significant after controlling for the return on the foreign (host country's) market (*RFST*) and the world index (*RWRD*). By comparison, the NAV return displays absolutely no exposure to *RSP*. Not surprisingly, the difference between fund return and NAV return, *RFND-RNAV*, has a significant positive beta with *RSP*. However, the difference between the exposures of the fund and the NAV to *RSP* is marginally statistically significant only at the one-week horizon (t-statistic = 7.22). At the four and thirteen week horizons, the difference is not statistically significant. By contrast, and more interesting perhaps, fund return betas with respect to *RSML-RSP*, the excess return on small U.S. firms, are significantly higher that the corresponding NAV

betas at *every* holding period horizon, after controlling for the effects of the other financial variables.

IV.3 Is the Noise-Trader Interpretation Reasonable?

Table 8a suggests that country fund prices over-react to US and world financial returns, but under-react to price innovations in the stock markets of the host countries and to currency revaluations. can the noise-trader story accommodate these observations? Although the model does not explicitly specify the origin or source of investor sentiment and misperceptions. Shiller [1984] discusses two characterizations of sentiment which may be relevant for the pricing of country funds. In the first characterization, investors' misperceptions of returns are the result of an over-reaction (or under-reaction) to news about fundamentals. In this case, news about future dividends, for example, elicits an unwarranted change in the difference between noise traders' perception of future dividends on an asset and the corresponding perception of rational investors. In the context of publicly-traded fund pricing, positive domestic news that increases the level of the broad U.S. market and positive "world" news that raises the level of the world market would unduly raise the fund price and decrease the discount of country funds.[30] Conversely, investors may not make immediate effective use of all available information, and thus under-react to innovations in the host country's stock market and to innovations in the exchange rate.

An alternative characterization of sentiment is given by Shiller as follows: sentiment may be the result of "fluctuations in attitudes which occur widely in the population and often appear without any apparent logical reason." In this case, variations in discounts on the country funds would reflect widespread changes in noise-trader sentiment unrelated to changes in fundamentals. A possible implication of this view is that the same investor sentiment that affects discounts on country funds must affect other assets as well which have little to do with the country funds. Recall from the theoretical discussion that if variation in sentiment in country funds is not correlated with fundamentals, then the same component of sentiment must appear across a wide range of assets. Although the theory does not specify which assets will be affected by the same widespread innovation in sentiment, a natural candidate for such assets are small capitalization stocks since individuals, who are more

likely to trade on sentiment and to misperceive fundamental value, specialize in both smaller stocks and publicly-traded funds (LST[1991]).

The results in Table 8a suggest that both interpretations of the noise-trader model may have some validity. The strong link between changes in the discount and the financial variables *RFST*, *REX*, *RWRD*, and *RSP*, suggest that investors over-react to fundamental revaluations that are closer to home and under-react to those with which they are less familiar, supporting the first interpretation. Moreover, the explanatory of excess small firm returns persists even when we control for variables such as *RWRD*, and *RSP*. This provides substantial support for the second interpretation of the noise-trading hypothesis, assuming that the excess return of small firms captures a sentiment factor independent of fundamentals.

IV.4 Two Extensions: The Influence of the Japanese Market and the Asymmetric Effect of News

The growth in country funds listed in New York has reflected more than just US investor demand. Just as the funds may be easy sells to American individuals, they may also appeal to Japanese individuals seeking to invest abroad. On February 19, 1990, near the market peak as measured by premia paid, market observers estimated that Japanese investors owned as much as 80 percent of the Spain and Germany funds. Some sources reported that major Japanese retail brokers were the buyers as prices rose and that they then sold the shares to their clients near the market top on the (irrational) enthusiasm generated by the events in Europe. The resultant sharp drop in the country fund premia, while reflecting the invariable dissipation of ordinary-investor sentiment as modelled above, may have been accelerated by Japanese individuals selling country fund shares in New York in order to meet margin calls on their portfolios as the Japanese equity market fell in the Spring of 1990. Alternatively, as part of the general "panic" on the Tokyo market between January and April 1990, Japanese individuals may have dumped international-linked assets, such as country funds, first. The fall in the prices of the funds held predominantly by the Japanese generally exceeded the fall in the Japan Nikkei index.[31]

The events described in the financial press raise two interesting issues. First, is there any validity to the idea that prices of New York-traded funds representing Latin American, European, and Asian stocks can

ostensibly diverge from fundamental value on the basis of developments in *Japanese* equity markets? Second, to what extent is investors' over-reaction documented in Table 8a asymmetric, in the sense that negative news about world or US fundamentals has a stronger "panic" effect on country fund prices, while positive news or noise elicits a positive, albeit smaller, over-reaction.

To examine the first issue, we modified the behavioral excess return equation estimated in Table 8 to include the current and 1 to 4 lagged returns of the Japanese stock market. We also divided the time series of country fund returns into two sub-periods: one part pertaining to the period of supposedly heavy Japanese involvement, i.e., August 1989 to July 1990, and a second part pertaining to all other weeks. The regression was estimated separately for each of the 13 funds which spanned the period of heavy Japanese involvement.[32] In general, our results were unimpressive. We found little evidence that events in the Japanese stock market had an additional effect on country fund excess returns either for the whole sample or for the period of heavy Japanese involvement. Moreover, including the current and lag values of Japanese market returns in the regression did not affect the relationship between the other financial variables (*DISC, RFST, REX, RWRD, RSP, RSML-RSP*) and the excess country fund returns (*RFND - RNAV*).

To examine asymmetries, we experimented with regressions of the form:

$$\sum_{n=1}^{N} (RFND_{t,t-n} - RNAV_{t,t-n})\ \beta_{0} + \beta_{1}\ DISC_{t,t} + \sum_{j=2}^{J} \beta_{j}^{PS} (\sum_{n=1}^{N} X_{j,t-n})^{PS} + \sum_{j=2}^{J} \beta_{j}^{NG} (\sum_{n=1}^{N} X_{j,t-n})^{NG} + e_{t,t-n}$$

The variable $(\Sigma X_{j,t+n})^{PS}$ takes on the value of the cumulative financial return, $\Sigma X_{j,t+n}$ is *positive* and takes on the value '0' if $\Sigma X_{j,t+n}$ is otherwise. Conversely, $(\Sigma X_{j,t+n})^{NG}$ takes on the value of $\Sigma X_{j,t+n}$ if $\Sigma X_{j,t+n}$ is *negative* and takes on the value '0' if $\Sigma X_{j,t+n}$ is otherwise. If the excess return on country funds responds in an asymmetric fashion to innovation in the financial variable X_j, the coefficients β_j^{PS} and β_j^{NG} will differ.

Although we found little evidence of an asymmetric response of the funds' excess returns with regard to the local stock market (*RFST*) or exchange rate (*REX*) in both univariate and multivariate regressions, we did find evidence of asymmetry in the response to other financial variables. Table 8b presents the results of one multivariate specification where we allow for asymmetric effects of *RWRD, RSP*, and *RSML-RSP*, for return

horizons of 1,4, and 13 weeks. Two results stand out. First, at the 1-week return horizon, but not at the 4- or 13-week horizon, we find a significant asymmetric response of country fund excess returns to the excess small firm return (*RSML-RSP*). The over-sensitivity to *RSML-RSP* exists exclusively in a down market. That is, when negative sentiment unrelated to fundamentals affects individual investors, it (negatively) affects their demand for country funds to a larger extent than positive sentiment would. Second, using the 4- and 13-week holding period returns, we found evidence of a significant asymmetric exposure of fund excess returns to world stock returns (*RWRD*). Specifically, the excess country fund returns are more greatly exposed to negative world stock returns than they are to positive world stock returns. That the asymmetry is strongest at long horizons suggests that investors over-react much more strongly, over time, to negative news about world fundamentals than they do about positive news about world fundamentals.

IV.5 Time-varying Risk Premia and Cross-Border Restrictions

It is conceivable that the explanatory variables in the regressions in Table 8a capture the influence of time-varying risk premia in a model with rational investors and market frictions. For example, if markets are segmented, innovations in the ratio of the domestic price of risk to the foreign market price of risk can affect the discounts. Such variation can result from changes in the volatility of domestic relative to foreign stock returns (BBNW [1990]). All else constant, an increase in the domestic price of risk will reduce the price of the fund (and increase the discount), and at the same time reduce the price of the domestic market index. An increase in the foreign price of risk will reduce the NAV (and lower the discount) while at the same time lowering the foreign market index. Compared to the fund price, the effect of segmentation would be to make the NAV more highly correlated with the local market index (*RFST*), and less correlated with the domestic market indices (*RSP*, *RSML*). Moreover, because the discount would reflect the ratio of the domestic price of risk to the foreign market price of risk, the discount would help predict the excess return on a fund.

To examine these issues, we divided our sample of funds according to whether their host equity markets are restricted or unrestricted. In each group of funds, we regressed the excess fund return (*RFND-RNAV*) on the

earlier explanatory variables. If market segmentation plays a role in the results in Table 8a, then *RFND-RNAV* would be more sensitive to foreign stock returns and less sensitive to U.S. (and world) stock returns for funds whose host countries restrict capital movements.

Table 9 contains the results of these regressions as well as tests of coefficient differences across the two groups of funds. In the one-week return horizon, the differences between the betas on the U.S. market indices (*RSP* and *RSML-RSP*) are not statistically significant (p-values 0.99 and 0.63). Interestingly, the exposure of *RFND-RNAV* of the restricted funds to the local market stock index (*RFST*) is significantly *smaller* than the exposure of the unrestricted funds to the same variable (p-value = 0.07). At the four-week return horizon, the differences in domestic market betas remain statistically insignificant, while the foreign market beta of the *restricted* funds remains significantly *lower* than that of the unrestricted funds. At the thirteen-week horizon, none of the observed betas differ significantly across the two groups.

The overall results show no strong evidence that market segmentation plays a role. Consequently, models of time-varying risk premia may have a difficult time explaining the variability of excess fund returns. Explicitly modelling the time-variation in the ratio of the foreign to domestic price of risk is left to future research.

IV.6 Emerging Equity Markets Versus Developed Equity Markets

In the last few years, a number of foreign stock markets became increasingly liquid and have emerged as vehicles for international investment. The *International Finance Corporation* classifies the stock markets of the following countries represented in our sample of country funds as "emerging markets": Portugal, Turkey, Mexico, Brazil, Chile, Philippines, India, Indonesia, Malaysia, Korea, Thailand, and Taiwan. Because these markets are new to U.S. investors, information about fundamentals affecting asset prices in these countries may be harder (or costlier) to collect and interpret. As a result, the country fund price may be sticky with respect to developments in the emerging markets which affect fundamentals. Conversely, U.S. investors might place undue reliance on information on U.S. fundamentals as a substitute for fundamentals in the foreign market. To test for

differences between emerging and developed markets, we divided our sample of funds according to whether the host market is developed or emerging and for each group regressed the excess fund return *RFND*-RNAV on the financial variables in multivariate regressions.

Table 10 contains the results of these regressions along with tests of coefficient differences across the emerging and developed funds. The results for return horizons of one, four, and thirteen weeks are presented in Panels A, B, and C, respectively. In the one-, four, and thirteen-week horizon, the betas of excess returns (*RFND-RNAV*) of the emerging-markets funds are generally more highly exposed to U.S. and world risk than are the excess returns of the developed-market funds. However, these differences are far from statistically significant. There is weak evidence, on the other hand, that the excess sensitivity of emerging markets funds to the excess return on small-cap U.S. firms is greater than the corresponding exposure of the developed markets (p-values = 0.13 in Panel A, 0.05 in Panel B). Speculative bullishness by individuals for small firms may coincide with small investor sentiment for small countries.

IV.7 Regional Differences and Trading Hours Mismatch

As noted in our data section, the period over which the fund return is computed does not exactly overlap with the period over which the NAV return is computed. This mismatch arises because the local currency net asset value of the country funds is computed on the basis of the market prices prevailing at the close of stock trading in the host country. The fund's price in dollars, however, is computed on the basis of the last market transaction closest to the close of trading on the New York or American Stock Exchanges. Thus, fund prices and NAVs are only approximately synchronous.

Non-synchronous returns data may introduce biases in the return-generating equations estimated above, especially for the one-week horizon returns. For example, suppose that the U.S. and foreign fundamentals are correlated, and a country fund's price observations are matched with the weekly close of the *U.S.* market, while its NAV is matched with the weekly close of the *local* market. Then both the correlation of the fund's return with the foreign market and the correlation of the NAV return with the U.S. market will be biased downward.

As a result, the excess return on the fund may display an excess negative correlation with the foreign market and an excess positive correlation with the U.S. market, even if both fund and NAV reflect fundamental information. These biases will be least severe for funds whose host countries have trading hours most synchronous with the U.S. markets, and most severe for funds investing in countries whose trading hours are least synchronous.

To examine whether non-synchronous data can explain part of the correlations observed in Table 8a, we partitioned our sample into three groups based on the geographical region of the host country: east Asian (including Australia), European (including Turkey), and Latin American. The Latin American funds' NAV data are the most synchronous with the actual price data from New York trading. The east Asian funds are the least synchronous. For each geographic group, we regressed the one-week excess fund return, *RFND-RNAV*, on the explanatory variables. If non-synchronous trading accounts for part of the results in Table 8a, then *RFND-RNAV* of the East Asian funds will have the greatest (positive) exposure to U.S. stock returns, and the greatest (negative) exposure to local stock returns. Excess returns on Latin American would have the least exposure to both U.S. and local stock returns.

Table 11 contains the results of the regressions for the one-week holding-period horizon (where biases would be most important). The European funds have greater exposure to the local market stock returns (*RFST*) than either the Asian or Latin American funds. These differences are statistically significant in each case. Meanwhile, there is no significant difference between the betas of the Asian and Latin American funds with respect to the foreign stock returns. The excess returns of the Latin American funds have *more* exposure to the U.S. return indices (*RSP* and *RSML-RSP*) than do the Asian or European funds, even though the Latin funds suffer less from non-synchronous price/NAV observations. This difference is statistically significant for the beta with the large U.S. firm index, *RSP*, although insignificant for *RSP-RSML*. Thus, the findings in Table 11 do not support the hypothesis that non-synchronous data play a role in the findings of Table 8a.

V. Conclusion

This paper examined the weekly price behavior of 35 country funds that traded on the New York and

American Stock Exchanges between 1985 and 1993. The aim of the paper was to characterize some basic empirical regularities of country fund prices and to examine the extent to which the noise-trader model of asset prices is consistent with the regularities.

Unlike domestic-equity funds, not all country funds trade at an average discount. However, controlling for the effect of cross-border restrictions, we find that country funds adhere to the stylized facts established for domestic-equity funds: in the long run, discounts prevail for funds whose host countries allow free cross-border capital movements. Like their domestic-equity counterparts, country funds are typically issued at a premium, and this premium erodes by about 20% over the twenty four weeks that follow the IPO. the deterioration in the premium is the same for funds invested in restricted markets and those invested in unrestricted markets.

The noise trading model of DSSW [1990] can easily explain the previous evidence. The average discount for funds invested in countries with no restrictions on capital movements is attributable to noise-trader risk, which depresses fund prices relative to their NAVs. The premium at the initiation of a country fund is explained by the ability of fund organizers to time the issuance of country funds to coincide with positive investor sentiment. The subsequent decline in the premium is explained by mean reversion in investor sentiment.

Discounts vary substantially over time and contribute to a variance in country fund returns which is generally three time greater than the variance of the return on the underlying assets. However, discounts are largely stationary implying either: the NAV captures information about fundamental value not captured in the fund price (that is, the fund is mispriced); the fund price contains information about the fundamental not captured in the market value of the underlying assets or; both the fund price and the NAV carry fundamental information not captured by the other. Regressions of fund returns and NAV returns on discounts suggest that the discount has significant predictive power for the fund return, but little predictive power for the NAV return. This asymmetry suggests that mean-reverting sentiment is an important component of the price of the country funds but not in the market value of the underlying assets, so that it is the fund which is primarily mispriced. This is consistent with the idea that compared to the investor clienteles of country funds' underlying assets (presumably foreign institutions and individuals), U.S. individuals, the investor clientele of country funds, are prone to trade on sentiment and to misperceive fundamental value.

Estimation of an unobserved components model on the discounts of the nine oldest funds reveals a common component which is strongly persistent. This common and persistent behavior is consistent with the structure imposed on the noise trader model by DSSW [1990], which requires that variation in sentiment be systematic if it is to be priced in equilibrium. The common component we estimate accounts for roughly 20% of the variance of weekly country fund discounts. Examination of the estimated common component reveals that systematic variation in sentiment may be driven in part by widely noted world events such as the fall of the Berlin Wall. During the aftermath of this event in 1990, country fund IPOs peaked.

To capture the source of part of the variation in discounts over time, we ran regressions of the fund return, NAV return, and their difference -- the excess fund return -- on returns of a number of aggregate financial variables. We find that fund prices are "sticky", that is, they do not move as much as their respective NAVs, with respect to movements in the host country's aggregate stock market. Similarly, fund prices, which are quoted in dollars, are sticky with respect to exchange rate revaluations, although this is largely a short-horizon phenomenon. On the other hand, fund prices are overly sensitive to movements in world stock returns and to U.S. stock returns as captured by the *S&P 500*. The oversensitivity to the world stock market index is present for all holding-period horizons that we examine. Hence, if discounts reflect the sentiment and misperceptions of the country funds' investor clientele, then this sentiment is partly driven by "world" fundamentals.

The excess return on U.S. small firms, which are predominantly traded by individual investors is another significant factor in explaining contemporaneous country fund excess returns. Country fund prices are overly sensitive to the small-/large-capitalization return differential. This regression result is robust to the inclusion of other financial variables correlated with fund discounts, and is also robust to the return horizon. The finding upholds LST's [1991] idea that sentiment, if it is systematic, will affect assets with little fundamental similarity with country funds except that they share the same investor clientele, namely individual U.S. investors.

A model of rational traders could potentially explain the above correlations if the model is enriched by introducing sufficient frictions. Although we leave a deeper examination of this question to future research, we provide some evidence which casts doubt on the ability of rational models in the context of market imperfections

to explain variation in country fund discounts. First, apart from the evidence on the *average* discounts, we find no evidence that the discounts of funds whose host countries restrict cross-border equity investments behave differently from the discounts of funds that invest in unrestricted markets. Moreover, we also find little evidence in favor of market frictions caused by informational factors, or by non-synchronous data. For example, the excess returns of funds invested in emerging markets, where information about fundamentals may be harder or costlier to obtain, do not exhibit a higher correlation with the U.S. market than the excess return of country funds in developed markets. Similarly, the excess returns of funds whose price and NAV data suffer from the most time-mismatch do not generally exhibit higher correlations with the U.S. market. Overall, the facts we uncover present a challenge to asset-pricing models based on fully-rational international investors.

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1. The precursors to the modern publicly-traded country funds were the internationally diversified investment trusts first formed in Great Britain in the 1860s. They originally invested in foreign government bonds, and eventually diversified into foreign industrial bonds, land mortgages, and American railroad debentures. Foreign equity funds in the U.S. have a history dating back to 1951-52 with the Israel Development Corporation and the Canadian Fund. During the 1980s, the London and Hong Kong Stock Exchanges also emerged as centers for country fund trading.

2. Recent work on international investment has stressed the role of foreign and emerging markets in effective diversification (Divecha, Drach, and Stefak [1992]).

3. Although American Depository Receipts (ADRs) serve a similar purpose, they do not represent as broad a spectrum of countries, nor can they be used to diversify as extensively and costlessly in one foreign country as can be done with country funds.

4. The rise (fall) in the premiums (discounts) between Nov. 3, '89 and Jan. 26, '90 were as follows: AUS: 77%, FIB: 54%, SWH: 21%, ITL: 29%, MLY: 55%, THA: 60%, TAW: 27%.

5. In this regard, the work presented in Bodurtha, Kim, and Lee [1993] is in the same spirit and has results similar to ours.

6. LST [1991], for example, examine a sample of 20 primarily domestic-equity stock funds and find that on average, the value-weighted discount on a portfolio of these funds trades at 20 percent less than net asset value over the period 1965-85.

7. Ammer [1990], for example, finds that the organizational expenses of British closed-end funds fail to play a role in the time-series or cross-sectional variation in discounts.

8. The stylized facts are as follows. First, new funds are typically priced at a premium reflecting underwriting and organizational costs. Subsequent to the IPO, funds tend to underperform relative to other IPOs and returns on the net asset value (Peavey [1989] and Weiss [1990]). Six months following the IPO, the average fund trades at a significant discount. Second, Brauer [1984] and Brickley and Schallheim [1985] show that when funds announce plans to open-end or liquidate (and distribute the proceeds to shareholders) the discounts move toward zero and positive returns accrue to fund shareholders. Third, fund prices appear to be excessively volatile: the

variance of fund returns exceeds the variance of returns on the underlying assets (Sharpe and Sosin [1975]). Finally, portfolios of funds with large discounts subsequently generate excess risk-adjusted returns (Thompson [1978]) and abnormal profits can be generated using the information content of publicly-disclosed discounts (Richards, Fraser, and Groth [1980], and Anderson [1980]).

9. The demands of the two representative agents can be derived as the first-order condition of a problem in which each agent maximizes the expected value of an exponential utility function in next-period wealth and where asset prices are normally distributed (DSSW [1990]).

10. Another difference between country funds and domestic-equity funds is that a host government may withhold taxes upon distributions to country fund shareholders. With reciprocal agreements between the host government and the U.S. government, the U.S. shareholder will include the withheld taxes as a foreign tax credit against U.S. taxes. In the absence of reciprocal agreements, however, the shareholder may be doubly taxed. The latter may have the effect of depressing the fund's price below its NAV in the presence of cross-border investment restrictions.

11. Our classifications, "restricted" and "unrestricted", are based on the classification given in the International Finance Corporation's *Emerging Markets Handbook*. The IFC classifies countries into five categories according to their degree of openness: "free", "relatively free", "authorized investors", "special classes of shares", and "closed". We placed all countries represented in our sample which are not classified as emerging markets in the "unrestricted" category, along with those classified as "free" by the IFC. All others were placed in the restricted category.

12. The integrity of the data was ensured by checking all outliers and missing observations against the databases kept at the offices of the fund managers or administrators.

13. Pursuant to the Investment Company Act, the funds make two kinds of distributions: an income distribution based on portfolio earnings net of expenses, and a capital gains distribution based on realized portfolio appreciation. The shareholder is taxed on capital gains distributions at his relevant capital gains tax rate. Income distributions are taxed at the regular income tax rate. Whereas the Internal Revenue Code requires the funds to distribute at least 98 percent of its income in order to avoid an excise tax, the funds may choose to

retain capital gains. Most funds elect to make capital gains distributions, rather than retain them, because corporate tax rates on capital gains exceed individual rates. If the fund does choose to retain portfolio capital gains and pay taxes on them, the taxpaying shareholder can earn a tax credit equal to the proportionate amount share of Federal taxes paid by the fund on the shareholder's behalf and then increase the year-end cost basis of the shares by the retained amount. This is because the shareholder is deemed to have re-invested the amount retained by the fund net of tax (See Fredman and Scott [1992]).

14. Bonser-Neal, Brauer, Neal, and Wheatley [1991] demonstrate that a relation exists for all but one of the five countries examined, between announcements of changes in investment restrictions and changes in discounts and premia. BBNW confirm, however, that changes in cross-border restrictions are unable to account for much, if not all, of the time-variation in discounts and premia.

15. Weiss [1990] examines aftermarket prices of both domestic- and foreign-equity fund IPOs. Although she finds that the mean premium for a sample of foreign stock funds (country funds and internationally diversified funds) is significantly negative (-11.42%) six months following an IPO, unlike the domestic equity funds examined, the cumulative returns on the international funds over six months are not statistically different than zero. Because Weiss evaluates an earlier period (1985-87), her sample of 15 foreign funds is relatively small, and this may explain her negative results. Peavey [1990] examines IPOs and aftermarket performance of publicly-traded funds between 1986 and 1987, including five country funds. His tests make no reference to fund returns relative to NAV returns, yet he finds that T-bill-, and market-adjusted returns are significantly negative in the aftermarket.

16. Thompson [1978], using a sample of 23 (primarily NYSE) domestic equity funds traded between 1940 and 1975 demonstrates that risk-adjusted returns on portfolios of discounted fund shares, outperformed the market. Richards, Fraser, and Groth [1980] and Anderson [1985], using a sample of diversified and specialized domestic-equity funds derive optimal trading rules for earning excess rates of return.

17. Some commentators have argued that a country fund with a large premium may reflect underpricing of the underlying assets due to unwarranted bearishness by the local investors. For example, see the discussion in Fredman and Scott [1992] concerning the views of Jon Woronoff in the *International Fund Monitor*, June 1990.

18. For the equations describing the 13-week cumulative returns on the country funds, we find that the coefficient on the discount is positive and significant at the 10% level or less for 27 (79%) of the country funds. Using the normal approximation to the binomial distribution, and assuming cross-sectional independence, this result is associated with a p-value of less than 1% under the null hypothesis that no positive association exists between discounts and future returns on the fund.

19. LST[1991] examine the comovements in discounts by computing the pairwise correlations across ten funds using monthly data over a period of twenty years. They conclude that correlations are high enough to suggest that the discounts of different domestic funds move together.

20. The Kalman filter is a well-known way to compute the Gaussian likelihood function. The filter recursively constructs minimum mean-square error estimates of the unobserved state vector, given observations of the measurable variables. This has two parts: the transition equation and the measurement equations. The transition equation describes the evolution of the unobserved state variables, Z_t and $u_{t,r}$ and their respective lags. The measurement equation relates the observed variables to the state variable.

21. A specification test for the model was also conducted (Sargent and Sims [1977]). Specifically, we test the restriction that all comovements in the series arise from a single source against the alternative that they have an unrestricted covariance matrix. The test examines the implication that the spectral density matrix of the vector $DISC_t$, constructed by arranging the fund discounts into a $Kx1$ vector, has a factor structure. We perform the test by partitioning the cross-spectrum into five equally-spaced frequency bands. The χ^2 statistic has 275 degrees of freedom and equals 130.65 with a p-value of 0.99. This provides little evidence against the restrictions.

22. To pre-whiten the discount data, autoregressions of order 1 through 12 were run. The order of the process was selected so that it minimized the maximum deviation from the cumulative spectrum of a white noise process.

23. Excluding the Germany Fund from the above procedures does not lead to a significant change in the test results or in the series plotted in Figure 3.

24. During the 1980s, offerings of domestic-equity funds peaked in 1986 and 1987, prior to the stock market crash.

25. The Newey-West t-statistics of Panels B and C treat the stacked data as a single time-series, that is, they do not recognize the break in the stacked data between two separate funds. This fact is likely to bias the reported t-statistics slightly downward.

26. It is interesting to note that the beta of the underlying assets (NAV) with the local market is significantly less than one in the multivariate regressions that control for exchange-rate changes. This potentially reflects one of two things. First, the foreign equity holdings of the funds may indeed be less "risky" than the foreign market. By holding a disproportionate amount of small firms, the fund reduces its exposure to a foreign market index that may be dominated by two or three large firms (Mexico is a well-known example). Second, a country fund is never 100% fully-invested in the foreign equity market it represents, especially if the fund is new and still holds a large portion of the IPO proceeds as cash. In general, the fund's NAV may represent non-equity assets such as: local and dollar-denominated time deposits and repurchase agreements, tax refunds, interest receivable, and currency options.

27. The exchange rate, of course, is a component of the NAV computation (see section II).

28. That the NAV retains exposure to both the world index and the U.S. index, after controlling for the local market return, may reflect the choice of fund managers to invest in firms which are export-oriented and more highly linked to the world and U.S. economies that the firms represented in the host country's stock market in general.

29. This result may be implicit in Bailey and Lim [1992]. They find that country fund price volatility is higher during New York trading hours rather than during host country trading hours.

30. Evidence of such a phenomenon is found in Roll [1992], who shows that international stock correlations for firms within a given industry are "too low." That country fund prices may over-react to innovations in the world index, controlling for innovations in the domestic (U.S.) index, may be evidence that country fund investors have some sophistication in that they react (albeit excessively) to extra-national events. Alternatively, country fund investor clienteles may include Japanese individuals who over-react to fundamental innovations in their own country, which is given much weight in the value-weighted world stock market index.

31. To see how the popular press covered these events, see: Tatiana Pouschine, "How do you say 'manipulation' in Japanese," in *Forbes*, February 19, 1990; Nikhil Hutheesing, "What did in those country funds," *Forbes*, May 28, 1990; Deborah Hargreaves, "Korea Fund comes at difficult time," *Financial Times*, April 24, 1990; and "The Spain Fund Saga," in *Barron's*, September 25, 1989.

32. The funds are: BRZ,FAS,FIB,GER,SWH,ITL,KOR,MLY,MEX,SPN,TAW,THA,UKF.

Table 1

Sample of Closed-End Country Funds

Dates of Initial Public Offerings and Dates of Initial Time-Series Observations

Country Fund (CODE)	Date of Initial Public Offering (IPO)	Date of Initial Time-Series Observation
Austria (AUS)	9-21-89	10-6-89
Brazil (BRZ)	3-31-88	4-15-88
Brazil Equity (BRE)	4-3-92	4-10-92
Chile (CHL)	9-26-89	10-20-89
Emerging Germany (EMG)	3-29-90	4-20-90
Emerging Mexico (EMX)	10-2-90	10-12-90
First Australia (FAS)	12-12-85	1-3-86
First Iberian (FIB)	4-3-88	4-22-88
First Philippine (FPH)	11-8-89	12-1-89
France Growth (FRG)	5-10-90	7-27-90
Future Germany (FTG)	2-27-90	3-9-90
Germany (GER)	7-18-86	8-22-86
Growth Fund of Spain (GSP)	2-14-90	3-9-90
Helvetia (Swiss) (SWH)	8-19-87	8-28-87
India Growth (ING)	8-12-88	8-26-88
Indonesia (IND)	3-1-90	3-16-90
Irish Investment (IRE)	3-3-90	4-13-90
Italy (ITL)	2-26-86	4-4-86
Jakarta Growth (JKG)	4-16-90	4-20-90
Japan OTC (JPO)	3-14-90	3-30-90
Korea (KOR)	8-22-84	1-4-85
Korean Investment (KIN)	2-18-92	3-13-92
Malaysia (MLY)	5-8-87	6-5-87
Mexico Equity and Income (MEI)	8-14-90	9-7-90
Mexico (MEX)	6-3-81	1-3-86
New Germany (NGR)	1-24-90	2-9-90
Portugal (PTG)	11-1-89	11-17-89
ROC Taiwan (ROC)	5-19-89	5-19-89
Singapore (SNG)	7-24-90	8-3-90
Spain (SPN)	6-21-88	7-15-88
Taiwan (TAW)	12-23-86	2-13-87
Thai (THA)	2-17-88	2-26-88
Thai Capital (THC)	5-22-90	6-8-90
Turkish Investment (TRK)	12-5-89	12-15-89
United Kingdom (UKF)	8-6-87	8-7-87

Source: IPO dates are from Moody's Financial Manual.

Table 2

Market Capitalization and Institutional Holdings of Country Funds

Summary statistics for the sample of 35 country funds are compared to a sample of domestic equity funds and to a sample of operating firms whose average capitalization is comparable to the country funds. The sample of domestic equity funds is taken from the list of "general equity funds" in *Barron's*. The samples of operating firms are random samples drawn from drawn from the third and fourth quintiles in *Standard & Poor's Industrial Compustat* Tape, on the basis of total market capitalization (first quintile being the smallest firms). See the text for a description of the classification of country funds into the *unrestricted* and *restricted* samples.

	Number of Firms/Funds In Sample	Average Market Capitalization ($ Million)	Average Number of Institutional Owners	Average Percent of Shares Held by Institutions
Country Funds	35	110.92	18	14
Unrestricted	21	87.13	16	11
Restricted	14	146.6	21	18
Domestic Funds	19	402.4	23	6
Third Quintile *Compustat* Firms	40	57.13	22	25
Fourth Quintile *Compustat* Firms	43	236.13	60	40

Source: Data on market capitalization and institutional holdings is from *Standard & Poor's Stock Guide* for December 1992.

Table 3

Variable Definitions and Construction

$FND_{i,t}$	Dollar price of country fund i at the end of week t. All prices are recorded at Friday's market close in New York with the following exceptions: the Brazil (BRZ), Brazil Equity (BRE) Emerging Mexico (EMX), Mexico Equity and Income (MEI), Mexico (MEX), Singapore (SNG), and Taiwan (TAW) fund prices are recorded at Thursday's market close; the India Growth Fund (ING) prices are recorded at the Wednesday close. If the reporting day is a New York holiday, the previous day's New York closing prices are used.
$NAV_{i,t}$	Dollar net asset value of fund i at the end of week t. The NAV is computed by the fund itself using the local-currency prices of the underlying assets recorded at Friday's local market close and the Friday afternoon fix for exchange rates in New York with the following exceptions: the BRZ, BRE, EMX, MEI, MEX, SNG, and TAW funds construct the NAV using prices at Thursday's local market close, and Thursday afternoon's New York exchange rate. The ING fund uses Wednesday's prices and exchange rates. If the reporting day is a New York holiday, the previous day's local closing prices and exchange rates are used.
$REX_{i,t+1}$	$\ln(EX_{i,t+1}/EX_{i,t})$, the continuously compounded weekly dollar return on holding a unit of the currency of the country represented by fund i. $EX_{i,t}$ represents the exchange rate at 3:00 p.m. in New York (expressed in dollars per foreign currency unit) at the end of week t, where the day marking the end of the week matches the day on which $FND_{i,t}$ and $NAV_{i,t}$ are recorded. Source: Federal Reserve Bank of New York for the currencies of Australia, Austria, France, Germany, Ireland, Italy, Japan, Spain, Switzerland, and UK (all bids). Remaining exchange rates come from Banque de Generale through Data Resources (DRI), and reflect the middle of the bid-ask spread.

Table 3 *continued*

$RFST_{t,t+1}$ — $\ln(FST_{t+1}/FST_t)$, the weekly return (excluding dividends) on the host country's aggregate stock market in local currency units. FST_t is the host country's aggregate stock market price index in local currency at the end of week t, matching the day that FND and NAV are recorded. Source: Morgan Stanley Capital International (MSCI) through DRI.

$RSP_{t,t+1}$ — $\ln(SP500_{t+1}/SP500_t)$, the weekly return on the Standard and Poor's 500 (excluding dividends), computed separately for each fund to match the same calendar horizon as RFND and RNAV. Source: DRI.

$RSML_{t,t+1}$ — $\ln(R2000_{t+1}/R2000_t)$, the weekly return on the Russell-2000 index of small capitalization stocks (excluding dividends), computed separately for each fund to match the same calendar horizon as RFND and RNAV. Source: DRI.

$RWRD_{t,t+1}$ — $\ln(WORLD_{t+1}/WORLD_t)$, the weekly return on the world stock market in dollars (excluding dividends), computed separately for each fund to match the same calendar horizon as RFND and RNAV. Source: MSCI through DRI.

Table 4

Post-Offering Price Performance and Average Premium/Discount(-) of Country Funds

The table reports the cross-sectional means and standard errors of the premium/discount on the first date for which the fund reports a net asset value and at subsequent four-week intervals. In all but two cases, (MEX and KOR) the first NAV observation date corresponds to the first sample observation reported in Table 1. The first NAV observation date usually follows the IPO by two to three weeks. The table applies the convention that premia are denoted as positive while discounts are denoted as negative. See the text for a description of the classification of *unrestricted* and *restricted* funds.

	Average Premium/ Discount	Mean Underwriter's Premium	Mean Premium at First Observation	Mean Premium at:						Average Prem./Disc. (Not incl. weeks 0 to + 24)
				+4	+8	+12	+16	+20	+24	
Country Funds (35)	-0.031 (0.025)	0.0755	0.142 (0.049)	0.061 (0.053)	0.031 (0.049)	-0.002 (0.038)	-0.044 (0.037)	-0.061 (0.036)	-0.070 (0.045)	-0.056 (0.022)
Unrestricted (21)	-0.067 (0.019)	0.0767	0.074 (0.034)	-0.019 (0.037)	-0.023 (0.041)	-0.047 (0.035)	-0.098 (0.031)	-0.117 (0.022)	-0.139 (0.021)	-0.091 (0.019)
Restricted (14)	0.020 (0.048)	0.0737	0.244 (0.106)	0.180 (0.113)	0.112 (0.055)	0.112 (0.057)	0.081 (0.055)	0.058 (0.044)	0.068 (0.047)	-0.007 (0.044)

Table 5

Tests of the Non-Stationarity of Country Fund Discounts

The table reports the results from applying Stock and Watson's [1988] unit-root test (for a univariate time-series) to the country fund discount data. The test requires first transforming each fund's discount by taking first differences. The first-differenced series are then passed through two separate filters. The first filter removes autoregressive dependence of order 1 or 8 (the "autocorrelation correction") as well as a time trend. The second filter makes the autocorrelation correction of order 1 or 8 but does *not* remove the time trend. Each filtered series $F\Delta DISC_{i,t}$ is then regressed on the lagged value of the discount:

$$F\Delta DISC_{i,t} = - b_i DISC_{i,t-1} + e_{i,t}$$

The table reports (for each fund) the test statistics associated with the null hypothesis that b_i is less than or equal to zero (a unit root). The test statistics are distributed under the null according to the empirical distributions given in Stock and Watson [1988].

Table 5 *continued*

Fund	Time Series Observations	Stock-Watson Test Statistic			
		Autoregressive Corrections = 1		Autoregressive Corrections = 8	
		Time-Trend Filtered	Not Time-Trend Filtered	Time-Trend Filtered	Not Time-Trend Filtered
AUS	174	-2.37	-2.39	-2.70	-2.93 **
BRZ	251	-3.25 *	-2.05	-2.04	-1.19
BRE	43	-3.05	-2.21	-2.43	-1.94
CHL	172	-2.50	-2.70 *	-1.59	-2.08
EMG	146	-4.48 ***	-4.01 ***	-3.35 *	-2.55
EMX	121	-4.47 ***	-2.97 **	-3.55 **	-2.33
FAS	370	-4.37 ***	-4.28 ***	-4.00 ***	-3.72 ***
FIB	250	-2.70	-2.54	-2.43	-2.36
FPH	167	-2.71	-3.00 **	-4.36 ***	-4.66 ***
FRG	132	-5.19 ***	-3.97 ***	-2.22	-1.55
FTG	152	-4.46 ***	-4.22 ***	-3.85 **	-3.49 ***
GER	337	-3.54 **	-3.25 **	-3.14 *	-2.93 **
GSP	152	-3.35 *	-3.19 **	-2.77	-2.38
SWH	284	-4.40 ***	-3.59 ***	-3.56 **	-3.00 **
ING	323	-	-	-	-
IND	151	-3.88 **	-2.93 **	-3.29 *	-2.02
IRE	147	-4.25 ***	-3.31 **	-3.00	-1.82
ITL	357	-4.10 ***	-3.61 ***	-4.09 ***	-3.49 ***
JKG	145	-3.33 *	-2.36	-3.72 **	-1.95
JPO	148	-2.76	-2.20	-3.72 **	-2.41
KOR	422	-2.69	-2.43	-3.04	-2.74 *
KIN	47	-1.43	-1.81	-2.22	-2.77 *
MLY	296	-3.00	-3.02 **	-3.43 **	-3.42 **
MEI	126	-4.27 ***	-2.64 *	-3.97 ***	-2.33
MEX	370	-4.97 ***	-3.87 ***	-3.70 **	-2.54
NGR	156	-4.82 ***	-5.12 ***	-2.72	-2.87 **
PTG	168	-2.84	-2.93 **	-3.26 *	-3.44 ***
ROC	194	-3.53 **	-3.07 **	-4.42 ***	-3.60 ***
SNG	131	-4.24 ***	-2.07	-2.99	-2.24
SPN	238	-1.82	-1.73	-2.40	-2.30
TAW	312	-3.43 **	-3.42 **	-4.21 ***	-3.73 ***
THA	258	-3.39 *	-2.58 *	-3.28 *	-2.27
THC	139	-4.18 ***	-4.22 ***	-3.22 *	-3.22 **
TRK	164	-3.22 *	-1.55	-2.15	-1.23
UKF	287	-7.22 ***	-4.49 ***	-3.80 **	-2.66 *
Number Significant at the 10% level		23/34 68%	23/34 68%	20/34 59%	16/34 47%

Note: * Test statistic is significant at the 10% level; ** Test statistic is significant at the 5% level;

*** Test statistic is significant at the 1% level.

Table 6

The Predictive Power of Country Fund Discounts

Results from the following regressions are presented:

Panel A:

$$\sum_{n=1}^{N} RFND_{i,t-n} = \alpha'_i + \beta'_i DISC_{i,t} + e_{i,t}$$

Panel B:

$$\sum_{n=1}^{N} RNAV_{i,t-n} = \alpha'_i + \beta'_i DISC_{i,t} + e_{i,t}$$

where $RFND_i$ and $RNAV_i$ are the returns on fund i and on the net assets of fund i, respectively, $DISC_{i,t}$ is the discount on the i^{th} country fund at the end of week t. α_i and β_i are fund-specific parameters. The regressions are generated for cumulative return horizons of 1,4, and 13 weeks (N=1,4,13). Test statistics are based on standard errors corrected for conditional heteroskedasticity (N=1) and for autocorrelation of order $N-1$ (N=4,13) using the methods in White [1980] and Newey and West [1987], respectively.

Table 6 *continued*

Panel A: Cumulative Return on the Fund is Regressed on the Discount

Fund	Return Horizon = 1 week		Return Horizon = 4 weeks		Return Horizon = 13 weeks	
	β'_i	adj. R^2	β'_i	adj. R^2	β'_i	adj. R^2
AUS	0.033	0.00	0.063	-0.00	0.173	0.01
BRZ	0.027	0.01	0.033	0.00	0.104	0.01
BRE	0.249 **	0.10	0.849 ***	0.41	0.823 ***	0.14
CHL	0.129 ***	0.06	0.340 ***	0.12	0.934 ***	0.27
EGR	0.289 ***	0.10	0.711 ***	0.20	0.938 ***	0.23
EMX	0.303 ***	0.09	0.592 ***	0.11	1.432 **	0.16
FAS	0.117 ***	0.04	0.272 **	0.06	0.517 **	0.08
FIB	0.057 ***	0.02	0.214 **	0.07	0.405 *	0.10
FPH	0.076 ***	0.04	0.237 **	0.13	0.828 ***	0.47
FRG	0.584 ***	0.28	1.055 ***	0.40	1.140 ***	0.36
FTG	0.330 ***	0.13	0.853 ***	0.26	1.107 ***	0.34
GER	0.064 *	0.01	0.170	0.03	0.400 *	0.06
GSP	0.225 ***	0.08	0.578 ***	0.12	1.084 ***	0.16
SWH	0.129 ***	0.05	0.283 ***	0.07	0.655 ***	0.16
ING	-	-	-	-	-	-
IND	0.100 *	0.03	0.160	0.03	0.004	-0.01
IRE	0.251 ***	0.16	0.558 ***	0.23	1.067 ***	0.29
ITL	0.079 ***	0.03	0.242 ***	0.07	0.570 ***	0.16
JKG	0.065 *	0.01	0.167 *	0.04	0.422 *	0.09
JPO	0.014	-0.01	0.088	0.00	0.701 ***	0.25
KOR	0.026 *	0.01	0.090 *	0.02	0.297 **	0.34
KIN	0.012	-0.02	0.030	-0.02	0.043	0.07
MLY	0.077 **	0.03	0.288 ***	0.10	0.940 ***	-0.02
MEI	0.298 ***	0.14	0.713 ***	0.25	1.323 ***	0.34
MEX	0.077 ***	0.02	0.184 **	0.03	0.416 *	0.33
NGR	0.168 ***	0.11	0.497 ***	0.28	0.737 ***	0.05
PTG	0.081 **	0.03	0.231 **	0.07	0.595 ***	0.43
ROC	0.057 *	0.01	0.136	0.02	0.530 **	0.20
SNG	0.139 ***	0.07	0.366 ***	0.16	0.778 ***	0.10
SPN	0.022	0.00	0.079	0.02	0.400 **	0.35
TAW	0.006	-0.00	0.027	-0.00	0.179	0.12
THA	0.061 ***	0.02	0.149 **	0.14	0.305	0.03
THC	0.192 ***	0.06	0.615 ***	0.04	1.727 ***	0.05
TRK	0.029	0.00	0.036	-0.00	0.025	0.36
UKF	0.247 ***	0.10	0.512 ***	0.15	1.091 ***	-0.01
AVG	0.135	0.05	0.336	0.11	0.667	0.18

Table 6 *continued*

Panel B: Cumulative Return on the Net Asset Value is Regressed on the Discount

Fund	Return Horizon = 1 week		Return Horizon = 4 weeks		Return Horizon = 13 weeks	
	β^3_1	adj. R^2	β^3_1	adj. R^2	β^3_1	adj. R^2
AUS	-0.060 ***	0.06	-0.204 ***	0.18	-0.444 ***	0.30
BRZ	-0.026	0.00	-0.086	0.01	-0.137	0.01
BRE	-0.002	-0.02	0.222	0.01	0.109	-0.03
CHL	0.016	-0.00	0.054	0.00	0.409 **	0.10
EGR	-0.078	0.01	-0.036	-0.01	-0.128	0.00
EMX	0.030	-0.00	0.080	-0.00	0.680	0.05
FAS	-0.037	0.01	-0.072	0.00	-0.147	0.01
FIB	0.005	-0.00	0.009	-0.00	-0.047	0.00
FPH	-0.001	-0.01	-0.006	-0.01	0.080	0.01
FRG	0.039	-0.00	0.222 *	0.05	0.248 **	0.02
FTG	-0.027	-0.00	-0.007	-0.01	-0.025	-0.01
GER	-0.022	0.01	-0.052	0.01	-0.071	0.01
GSP	0.020	-0.01	0.074	-0.00	0.183	0.00
SWH	-0.016	-0.00	-0.031	-0.00	-0.054	-0.00
ING	-	-	-	-	-	-
IND	-0.046 **	0.04	-0.202 ***	0.14	-0.727 ***	0.37
IRE	-0.006	-0.01	0.026	-0.01	0.214	0.02
ITL	-0.017	0.00	-0.043	0.01	-0.137 *	0.03
JKG	-0.031	0.02	-0.109 ***	0.08	-0.234 *	0.08
JPO	-0.054 *	0.03	-0.171 **	0.08	-0.189	0.03
KOR	-0.009	0.00	-0.020	0.00	-0.054	0.01
KIN	-0.063	0.02	-0.293 **	0.19	-1.090 ***	0.82
MLY	0.001	-0.00	0.082 *	0.03	0.363 **	0.21
MEI	0.054 *	0.02	0.162 *	0.04	0.507	0.09
MEX	-0.016	-0.00	-0.063	0.00	-0.094	-0.00
NGR	-0.028	0.00	-0.059	0.01	-0.054	-0.00
PTG	-0.013	-0.00	-0.057	0.02	-0.159	0.04
ROC	-0.053 **	0.02	-0.178 **	0.05	-0.437	0.09
SNG	0.002	-0.01	0.037	-0.00	0.104	0.00
SPN	-0.004	-0.00	-0.013	-0.00	-0.020	-0.00
TAW	-0.044 ***	0.06	-0.171 ***	0.18	-0.440 ***	0.35
THA	-0.016	0.00	-0.035	0.00	0.602	0.08
THC	-0.050	0.00	-0.004	-0.01	-0.147	0.02
TRK	-0.034	0.00	-0.111	0.02	-0.386	0.09
UKF	0.003	-0.00	0.003	-0.00	0.387	0.07
AVG	-0.017	0.01	-0.031	0.03	-0.039	0.08

Note: * indicates significance at the 10% level; ** indicates significance at the 5% level;

*** indicates significance at the 1% level.

Table 7

Estimation of an Unobserved Components Model of Country Fund Discounts

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Results from estimating the following models are presented:

Panel A:

$$DISC_{i,t} = B_i Z_t + u_{i,t} \; ; \; Z_t = \alpha Z_{t-1} + e_t \; ; \; u_{i,t} = \delta_i u_{i,t-1} + v_{i,t} \; ; \; i = 1,\ldots,K$$

Panel B:

$$A_i(L) DISC_{i,t} = B_i Z_t + u_{i,t} \; ; \; Z_t = e_t \; ; \; u_{i,t} = v_{i,t} \; ; \; i = 1,\ldots,K$$

where e_t and $v_{i,t}$ are normally-distributed white noise errors. Z represents the common component in discount variation, $u_{i,t}$ is the idiosyncratic component of the discount of country fund i. L is the lag operator, and α and δ_i are autoregressive parameters to be estimated. Each of the two models is estimated with nine country funds (K=9) using weekly discount data over the period January 1988 through January 1993. The models are estimated by casting them in a vector state-space form and applying the Kalman filter to evaluate the likelihood functions. In the second model (Panel B), the discounts for the funds are each filtered through $A_i(L)$, a polynomial in L, to "pre-whiten" the data. The choice of A_i for $i = 1,\ldots,K$, is described in the text. In each case, the variance of e_t is normalized to 1, while $\sigma(v_i)$, the standard error of v_i, is an estimable parameter.

Table 7 *continued*

Panel A:

The estimate of α, the autoregressive parameter for the common factor Z_t, was estimated to be 0.96 (s.e. 0.031).

The parameters pertaining to the individual funds were estimated as follows:

Fund	Parameter		Contribution of variance of Z to variance of $DISC_t$
	B_i	δ_i	
FAS	0.0082 **	0.67	0.186
GER	0.0161 **	0.74	0.411
SWH	0.0081 **	0.57	0.286
ITL	0.0098 **	0.78	0.218
KOR	0.0059 *	0.98	0.077
MLY	0.0120 **	0.85	0.263
MEX	0.0080 **	0.81	0.120
TAW	0.0069 *	0.95	0.056
UKF	0.0048 **	0.64	0.136
AVG	0.0088	0.78	0.195

Table 7 *continued*

Panel B:

Fund	Parameter		Contribution of variance of Z to variance of $A_i(L)DISC_t$
	B_i	$\sigma(v_i)$	
FAS	0.027 ***	0.056	0.155
GER	0.047 ***	0.072	0.298
SWH	0.028 ***	0.045	0.274
ITL	0.024 ***	0.063	0.129
KOR	0.019 **	0.075	0.061
MLY	0.033 ***	0.070	0.185
MEX	0.025 ***	0.076	0.101
TAW	0.026 **	0.102	0.061
UKF	0.024 ***	0.039	0.272
AVG	0.028	0.066	0.171

Notes: * indicates significance at the 10% level; ** indicates significance at the 5% level;

*** indicates significance at the 1% level.

Table 8a

Country Fund Return-Generating Equations

Results from multivariate and univariate regressions are presented. The multivariate regression is of the form:

$$\sum_{n=1}^{N} RET_{i,t-n} = \beta_1 DISC_{i,t} + \beta_2 \sum_{n=1}^{N} RFST_{t,t-n} + \beta_3 \sum_{n=1}^{N} REX_{t,t-n} + \beta_4 \sum_{n=1}^{N} RWRD_{t-n} + \beta_5 \sum_{n=1}^{N} RSP_{t-n} + \beta_6 \sum_{n=1}^{N'} (RSML_{t-n} - RSP_{t-n}) + e_{i,t-n}$$

where *RET* represents the de-meaned return on either: the fund itself ($RFND_i$); the NAV of fund i ($RNAV_i$); or the difference ($RFND_i$-$RNAV_i$). The regressions are estimated for cumulative return horizons of 1,4, and 13 weeks (N=1,4,13) and are presented in Panels A, B, and C, respectively. The equations are estimated by stacking the country funds returns data so as to restrict the slope coefficients on the independent variables to be the same across funds. Numbers in parentheses are t-statistics corrected for conditional heteroskedasticity (Panel A) autocorrelation of order N-1 (Panels B and C) using the methods in White [1980] and Newey and West [1987], respectively. In the univariate regressions, the numbers in square brackets are the adjusted R^2s.

Table 8a *continued*

Panel A: Cumulative Return Horizon is One Week (N=1)

Multivariate Regression - Slope Coefficients and T-statistics							adj. R^2	Obs.
Dependent Variable	*DISC*	*ΣRFST*	*ΣREX*	*ΣRWRD*	*ΣRSP*	*ΣRSML-ΣRSP*		
ΣRFND	0.059 (10.1)	0.428 (21.3)	0.088 (1.96)	0.500 (10.5)	0.377 (7.26)	0.285 (5.48)	0.26	6469
ΣRNAV	-0.009 (-2.89)	0.608 (24.9)	0.621 (13.0)	0.153 (6.42)	-0.017 (-0.75)	0.070 (2.51)	0.63	6469
ΣRFND-ΣRNAV	0.069 (10.6)	-0.180 (-6.44)	-0.533 (-8.53)	0.344 (6.99)	0.394 (7.22)	0.215 (3.79)	0.11	6469

Univariate Regressions - Slope Coefficients, T-statistics, and Adjusted R^2						
Dependent Variable	*DISC*	*ΣRFST*	*ΣREX*	*ΣRWRD*	*ΣRSP*	*ΣRSML*
ΣRFND	0.053 (8.93) [0.02]	0.537 (24.5) [0.16]	0.019 (0.35) [0.00]	1.092 (24.6) [0.14]	0.969 (20.2) [0.11]	0.941 (23.1) [0.13]
ΣRNAV	-0.021 (-5.35) [0.01]	0.611 (23.5) [0.54]	0.491 (11.0) [0.05]	0.608 (21.3) [0.11]	0.380 (12.1) [0.04]	0.429 (13.4) [0.07]
ΣRFND-ΣRNAV	0.074 (12.23) [0.04]	-0.074 (-2.57) [0.00]	-0.472 (-8.66) [0.02]	0.484 (11.3) [0.03]	0.590 (13.1) [0.04]	0.511 (12.4) [0.04]

Table 8a *continued*

Panel B: Cumulative Return Horizon is Four Weeks (N=4)

Multivariate Regression - Slope Coefficients and T-statistics							adj. R^2	Obs.
Dependent Variable	*DISC*	*ΣRFST*	*ΣREX*	*ΣRWRD*	*ΣRSP*	*ΣRSML-ΣRSP*		
ΣRFND	0.155 (10.9)	0.557 (23.9)	0.470 (10.5)	0.584 (11.7)	0.118 (2.19)	0.347 (8.01)	0.46	6367
ΣRNAV	-0.028 (-3.46)	0.697 (50.0)	0.700 (18.8)	0.111 (4.49)	0.020 (0.85)	0.031 (1.36)	0.77	6367
ΣRFND-ΣRNAV	0.183 (11.8)	-0.140 (-5.68)	-0.230 (-4.13)	0.473 (9.12)	0.097 (1.76)	0.316 (6.99)	0.19	6367

Univariate Regressions - Slope Coefficients, T-statistics, and Adjusted R^2						
Dependent Variable	*DISC*	*ΣRFST*	*ΣREX*	*ΣRWRD*	*ΣRSP*	*ΣRSML*
ΣRFND	0.143 (8.03) [0.04]	0.649 (24.2) [0.31]	0.164 (2.38) [0.00]	1.331 (21.6) [0.24]	1.244 (18.2) [0.20]	0.913 (19.7) [0.21]
ΣRNAV	-0.064 (-4.42) [0.01]	0.675 (37.2) [0.66]	0.419 (5.40) [0.03]	0.745 (14.0) [0.14]	0.656 (11.0) [0.11]	0.488 (11.4) [0.12]
ΣRFND-ΣRNAV	0.208 (13.8) [0.12]	-0.027 (-1.04) [0.00]	-0.255 (-4.73) [0.01]	0.586 (13.4) [0.07]	0.588 (13.1) [0.07]	0.425 (13.3) [0.07]

Table 8a *continued*

Panel C: Cumulative Return Horizon is Thirteen Weeks (N=13)

Multivariate Regression - Slope Coefficients and T-statistics							adj. R^2	Obs.
Dependent Variable	*DISC*	*ΣRFST*	*ΣREX*	*ΣRWRD*	*ΣRSP*	*ΣRSML-ΣRSP*		
ΣRFND	0.375 (11.2)	0.600 (15.8)	0.645 (9.16)	0.487 (5.34)	0.193 (2.14)	0.187 (3.05)	0.59	6061
ΣRNAV	-0.064 (-3.28)	0.718 (29.1)	0.751 (20.9)	0.050 (1.26)	0.089 (1.94)	-0.010 (-0.30)	0.82	6061
ΣRFND-ΣRNAV	0.439 (12.0)	-0.120 (-3.73)	-0.106 (-1.31)	0.437 (4.61)	0.104 (1.10)	0.196 (3.35)	0.36	6061

Univariate Regressions - Slope Coefficients, T-statistics, and Adjusted R^2						
Dependent Variable	*DISC*	*ΣRFST*	*ΣREX*	*ΣRWRD*	*ΣRSP*	*ΣRSML*
ΣRFND	0.396 (7.60) [0.09]	0.640 (16.7) [0.36]	0.056 (0.55) [0.00]	1.633 (17.3) [0.32]	1.556 (17.3) [0.32]	0.878 (16.0) [0.29]
ΣRNAV	-0.132 (-3.16) [0.02]	0.644 (30.0) [0.64]	0.319 (3.48) [0.03]	0.828 (9.18) [0.14]	0.855 (8.44) [0.17]	0.482 (9.31) [0.15]
ΣRFND-ΣRNAV	0.528 (14.5) [0.30]	-0.004 (-0.11) [0.00]	-0.263 (-5.66) [0.02]	0.805 (11.3) [0.14]	0.701 (9.85) [0.12]	0.397 (10.1) [0.11]

Table 8b

Country Fund Return-Generating Equations
Tests of Asymmetric Response to Financial Variables

Results from estimating multivariate regressions of the following form are presented:

$$\left(\sum_{n=1}^{N} RFND_{i,t-n} - \sum_{n=1}^{N} RNAV_{i,t-n}\right) = \beta_0 + \beta_1 DISC_{i,t} + \beta_2 \sum_{n=1}^{N} RFST_{i,t-n} + \beta_3 \sum_{n=1}^{N} REX_{i,t-n} + \beta_4^{PS}\left(\sum_{n=1}^{N} RWRD_{t-n}\right)^{PS} + \beta_5^{PS}\left(\sum_{n=1}^{N} RSP_{t-n}\right)^{PS} + \beta_6^{PS}\left(\sum_{n=1}^{N'}(RSML_{t-n} - RSP_{t-n})\right)^{PS}$$

$$+ \beta_4^{NG}\left(\sum_{n=1}^{N} RWRD_{t-n}\right)^{NG} + \beta_5^{NG}\left(\sum_{n=1}^{N} RSP_{t-n}\right)^{NG} + \beta_6^{NG}\left(\sum_{n=1}^{N'}(RSML_{t-n} - RSP_{t-n})\right)^{NG} + e_{i,t,t-n}$$

Results for cumulative return horizons of 1,4, and 13 weeks (N=1,4,13) are presented. The equations are estimated by stacking the country funds returns data so as to restrict the slope coefficients on the independent variables to be the same across funds. Numbers in parentheses are t-statistics corrected for conditional heteroskedasticity (for N=1) and autocorrelation of order N-1 (for N=4,13) using the methods in White [1980] and Newey and West [1987], respectively. The second to last column reports the p-value associated with the null hypothesis that the excess country fund returns display no asymmetries with respect to the financial variables, $\Sigma RWRD$, ΣRSP, and ($\Sigma RSML$ - $\Sigma RSML$).

Table 8b *continued*

Slope Coefficients and T-statistics										adj. R^2	Test of no asymmetries (p-value)	Obs.
Return Horizon	*DISC*	*ΣREST*	*ΣREX*	*ΣRWRD*		*ΣRSP*		*ΣRSML-ΣRSP*				
				(+)	(-)	(+)	(-)	(+)	(-)			
1 week (N=1)	-0.070 (-10.8)	-0.184 (-6.58)	-0.532 (-8.48)	0.279 (3.29)	0.372 (4.74)	0.472 (4.78)	0.350 (3.94)	-0.141 (-1.55)	0.573 (5.10)	0.12	0.00	6469
4 weeks (N=4)	-0.183 (-11.8)	-0.141 (-5.71)	-0.224 (-4.00)	0.366 (4.99)	0.592 (6.50)	0.085 (1.19)	0.087 (0.89)	0.240 (3.16)	0.365 (4.20)	0.19	0.08	6367
13 weeks (N=13)	-0.442 (-12.1)	-0.102 (-1.24)	-0.122 (-3.78)	0.248 (2.08)	0.639 (4.62)	-0.023 (-0.19)	0.124 (0.99)	0.182 (1.73)	0.222 (2.18)	0.37	0.00	6061

Table 9

Country Fund Return-Generating Equations
Results for Restricted and Unrestricted Markets

Results from multivariate regressions of the following form are presented.

$$\left(\sum_{n=1}^{N} RFND_{i,t-n} - \sum_{n=1}^{N} RNAV_{i,t-n}\right) = \beta_0 + \beta_1 DISC_{i,t} + \beta_2 \sum_{n=1}^{N} RFST_{i,t-n} + \beta_3 \sum_{n=1}^{N} REX_{i,t-n} + \beta_4 \sum_{n=1}^{N} RWRD_{t-n} + \beta_5 \sum_{n=1}^{N} RSP_{t-n} + \beta_6 \sum_{n=1}^{N} (RSML_{t-n} - RSP_{t-n}) + e_{i,t-n}$$

The sample of country funds is divided into two groups each representing funds investing in restricted and unrestricted equity markets, respectively. The regressions are estimated for cumulative return horizons of 1,4, and 13 weeks (N=1,4,13) and are presented in Panels A, B, and C, respectively. The equations are estimated by stacking the country funds returns data so as to restrict the slope coefficients on the independent variables to be the same across country funds within each group. Numbers in parentheses are t-statistics corrected for conditional heteroskedasticity (Panel A) and autocorrelation of order *N-1* (Panels B and C) using the methods in White [1980] and Newey and West [1987], respectively. The last line in each panel reports the p-values associated with the null hypothesis that the coefficients are equal across the two groups of funds. See the text for a description of the classification into *restricted* and *unrestricted* funds.

Table 9 *continued*

Panel A: Cumulative Return Horizon is One Week (N=1)

Slope Coefficients and T-statistics							adj. R^2	Obs.
Market Status (Number of Funds)	*DISC*	*ΣRFST*	*ΣREX*	*ΣRWRD*	*ΣRSP*	*ΣRSML-ΣRSP*		
Restricted (13)	0.069 (8.38)	-0.113 (-4.07)	0.188 (1.13)	0.482 (6.19)	0.395 (4.57)	0.345 (3.86)	0.12	2238
Unrestricted (21)	0.069 (7.65)	-0.244 (-5.03)	-0.601 (-9.37)	0.311 (4.86)	0.394 (5.68)	0.160 (2.17)	0.12	4231
Test of Subsample Differences (p-value)	0.75	0.07	0.00	0.03	0.99	0.63	-	-

Panel B: Cumulative Return Horizon is Four Weeks (N=4)

Slope Coefficients and T-statistics							adj. R^2	Obs.
Market Status (Number of Funds)	*DISC*	*ΣRFST*	*ΣREX*	*ΣRWRD*	*ΣRSP*	*ΣRSML-ΣRSP*		
Restricted (13)	0.182 (9.61)	-0.074 (-2.19)	0.159 (0.93)	0.532 (6.19)	0.180 (1.92)	0.351 (4.68)	0.22	2199
Unrestricted (21)	0.183 (8.48)	-0.196 (-5.60)	-0.290 (-4.90)	0.482 (7.36)	0.064 (0.94)	0.277 (4.94)	0.18	4168
Test of Subsample Differences (p-value)	0.96	0.01	0.01	0.64	0.31	0.43	-	-

Table 9 *continued*

Panel C: Cumulative Return Horizon is Thirteen Weeks (N=13)

Slope Coefficients and T-statistics							adj. R^2	Obs.
Market Status (Number of Funds)	*DISC*	*ΣRFST*	*ΣREX*	*ΣRWRD*	*ΣRSP*	*ΣRSML-ΣRSP*		
Restricted (13)	0.482 (10.5)	-0.098 (-2.34)	0.243 (1.08)	0.555 (3.39)	0.083 (0.45)	0.236 (2.08)	0.43	2082
Unrestricted (21)	0.409 (8.13)	-0.151 (-3.08)	-0.157 (-1.73)	0.414 (3.60)	0.127 (1.15)	0.138 (1.90)	0.33	3079
Test of Subsample Differences (p-value)	0.29	0.41	0.10	0.46	0.81	0.46	-	-

Table 10

Country Fund Return-Generating Equations
Results for Emerging and Developed Equity Markets

Results from estimating multivariate regressions of the following form are presented:

$$\left(\sum_{n=1}^{N} RFND_{i,t-n} - \sum_{n=1}^{N} RNAV_{i,t-n}\right) = \beta_0 + \beta_1 DISC_{i,t} + \beta_2 \sum_{n=1}^{N} RFST_{i,t-n} + \beta_3 \sum_{n=1}^{N} REX_{i,t-n} + \beta_4 \sum_{n=1}^{N} RWRD_{t-n} + \beta_5 \sum_{n=1}^{N} RSP_{t-n} + \beta_6 \sum_{n=1}^{N} (RSML_{t-n} - RSP_{t-n}) + e_{i,t-n}$$

The sample of country funds is divided into two groups each representing either funds investing in emerging markets or funds investing in developed markets. The regressions are estimated for cumulative return horizons of 1,4, and 13 weeks (N=1,4,13) and are presented in Panels A, B, and C, respectively. The equations are estimated by stacking the country funds returns data so as to restrict the slope coefficients on the independent variables to be the same across country funds within each group. Numbers in parentheses are t-statistics corrected for conditional heteroskedasticity (Panel A) and autocorrelation of order $N-1$ (Panels B and C) using the methods in White [1980] and Newey and West [1987], respectively. The last line in each panel reports the p-values associated with the null hypothesis that the coefficients are equal across the two groups of funds. See the text for a description of the classification of funds into the *emerging* and *developed* samples.

Table 10 *continued*

Panel A: Cumulative Return Horizon is One Week (N=1)

Slope Coefficients and T-statistics							adj. R^2	Obs.
Market Status (Number of Funds)	*DISC*	*ΣRFST*	*ΣREX*	*ΣRWRD*	*ΣRSP*	*ΣRSML-ΣRSP*		
Emerging (18)	0.064 (7.97)	-0.167 (-5.06)	-0.337 (-2.51)	0.415 (5.83)	0.393 (4.72)	0.310 (3.52)	0.10	3120
Developed (16)	0.079 (7.17)	-0.222 (-5.19)	-0.661 (-10.6)	0.343 (4.94)	0.372 (5.36)	0.141 (2.00)	0.14	3349
Test of Subsample Differences (p-value)	0.27	0.31	0.03	0.47	0.84	0.13	-	-

Panel B: Cumulative Return Horizon is Four Weeks (N=4)

Slope Coefficients and T-statistics							adj. R^2	Obs.
Market Status (Number of Funds)	*DISC*	*ΣRFST*	*ΣREX*	*ΣRWRD*	*ΣRSP*	*ΣRSML-ΣRSP*		
Emerging (13)	0.161 (8.94)	-0.152 (-5.82)	-0.121 (-1.29)	0.542 (7.18)	0.159 (1.86)	0.366 (5.44)	0.20	3066
Developed (21)	0.227 (7.92)	-0.059 (-0.90)	-0.353 (-5.85)	0.408 (5.34)	0.007 (0.10)	0.187 (3.20)	0.19	3301
Test of Subsample Differences (p-value)	0.05	0.18	0.04	0.21	0.16	0.05	-	-

Table 10 *continued*

Panel C: Cumulative Return Horizon is Thirteen Weeks (N=13)

Slope Coefficients and T-statistics							adj. R^2	Obs.
Market Status (Number of Funds)	*DISC*	*ΣRFST*	*ΣREX*	*ΣRWRD*	*ΣRSP*	*ΣRSML-ΣRSP*		
Emerging (18)	0.385 (8.85)	-0.159 (-4.58)	-0.177 (-1.57)	0.473 (3.09)	0.184 (1.15)	0.274 (2.98)	0.37	2904
Developed (16)	0.538 (8.30)	-0.038 (-0.51)	-0.004 (-0.06)	0.292 (2.60)	0.026 (0.23)	0.127 (1.87)	0.37	3157
Test of Subsample Differences (p-value)	0.05	0.02	0.19	0.33	0.42	0.20	-	-

Table 11

Country Fund Return-Generating Equations
Results for East Asian, European, and Latin American Funds

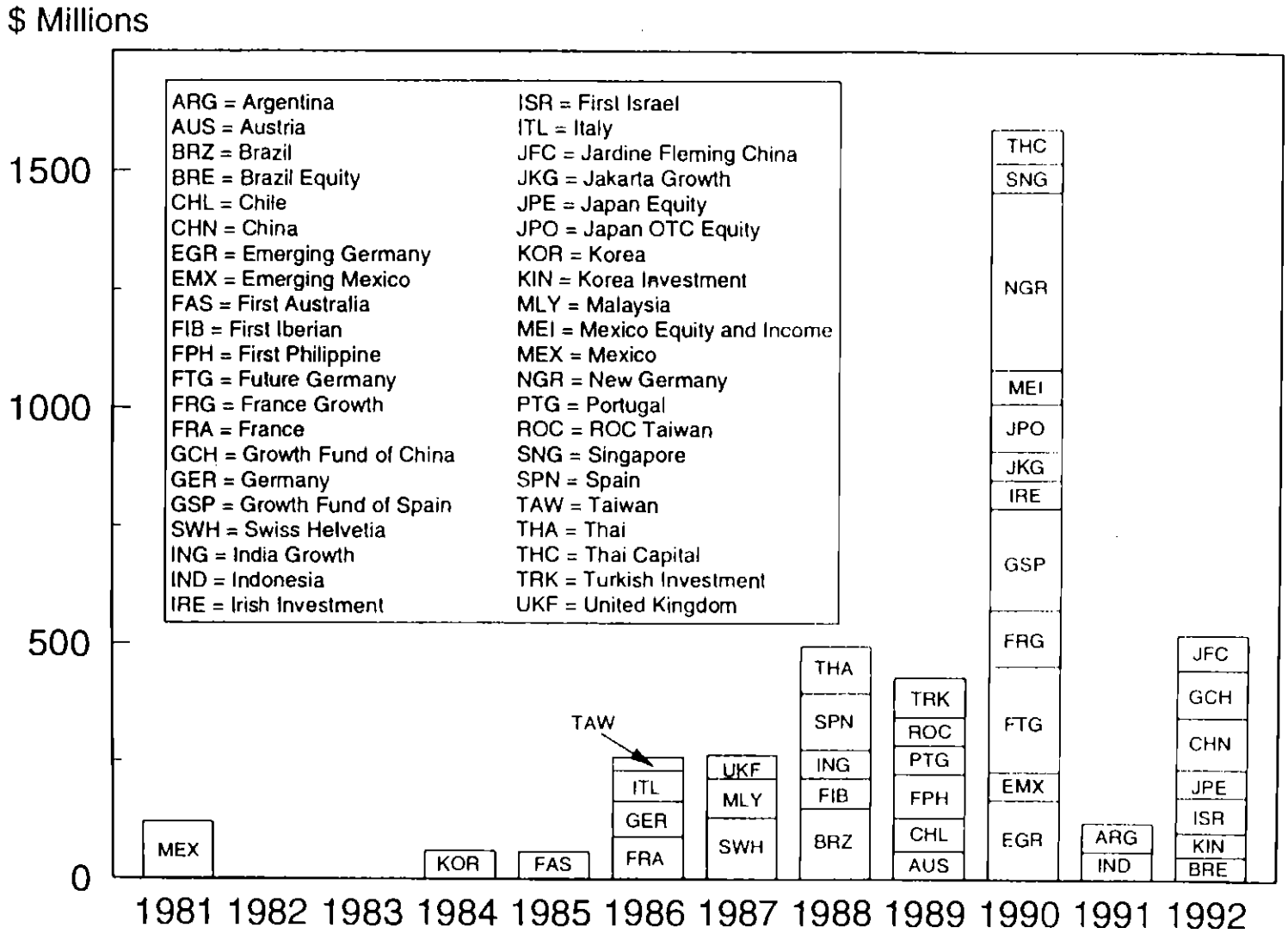
Results from estimating multivariate regressions of the following form are presented:

$$\left(\sum_{n=1}^{N} RFND_{i,t-n} - \sum_{n=1}^{N} RNAV_{i,t-n}\right) = \beta_0 + \beta_1 DISC_{i,t} + \beta_2 \sum_{n=1}^{N} RFST_{i,t-n} + \beta_3 \sum_{n=1}^{N} REX_{i,t-n} + \beta_4 \sum_{n=1}^{N} RWRD_{t-n} + \beta_5 \sum_{n=1}^{N} RSP_{t-n} + \beta_6 \sum_{n=1}^{N'} (RSML_{t-n} - RSP_{t-n}) + e_{i,t-n}$$

The sample of country funds is divided into three groups representing funds investing in the Far East, Europe, and Latin America, respectively. Regressions are estimated for cumulative return horizons of 1 week (N=1). The equations are estimated by stacking the country funds returns data so as to restrict the slope coefficients on the independent variables to be the same across country funds within each group. Numbers in parentheses are t-statistics corrected for conditional heteroskedasticity using the method in White [1980].

	Slope Coefficients and T-statistics						adj. R^2	Obs.
Region (Number of Funds)	*DISC*	*ΣRFST*	*ΣREX*	*ΣRWRD*	*ΣRSP*	*ΣRSML-ΣRSP*		
East Asian Funds (13)	0.068 (8.08)	-0.157 (-5.25)	-0.438 (-5.77)	0.460 (5.77)	0.358 (4.34)	0.238 (2.54)	0.11	2406
European (15)	0.073 (6.94)	-0.278 (-7.23)	-0.670 (-11.0)	0.425 (5.88)	0.317 (4.29)	0.176 (2.39)	0.14	3097
Latin American (6)	0.064 (3.62)	-0.139 (-2.00)	-0.327 (-1.97)	0.139 (1.07)	0.648 (3.49)	0.301 (1.75)	0.08	966

List of Figures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EMX = Emerging Mexico
FAS = First Australia
FIB = First Iberian
FPH = First Philippine
FTG = Future Germany
FRG = France Growth
FRA = France
GCH = Growth Fund of China
GER = Germany
GSP = Growth Fund of Spain
SWH = Swiss Helvetia
ING = India Growth
IND = Indonesia
IRE = Irish Investment
ISR = First Israel
ITL = Italy
JFC = Jardine Fleming China
JKG = Jakarta Growth
JPE = Japan Equity
JPO = Japan OTC Equity
KOR = Korea
KIN = Korea Investment
MLY = Malaysia
MEI = Mexico Equity and Income
MEX = Mexico
NGR = New Germany
PTG = Portugal
ROC = ROC Taiwan
SNG = Singapore
SPN = Spain
TAW = Taiwan
THA = Thai
THC = Thai Capital
TRK = Turkish Investment
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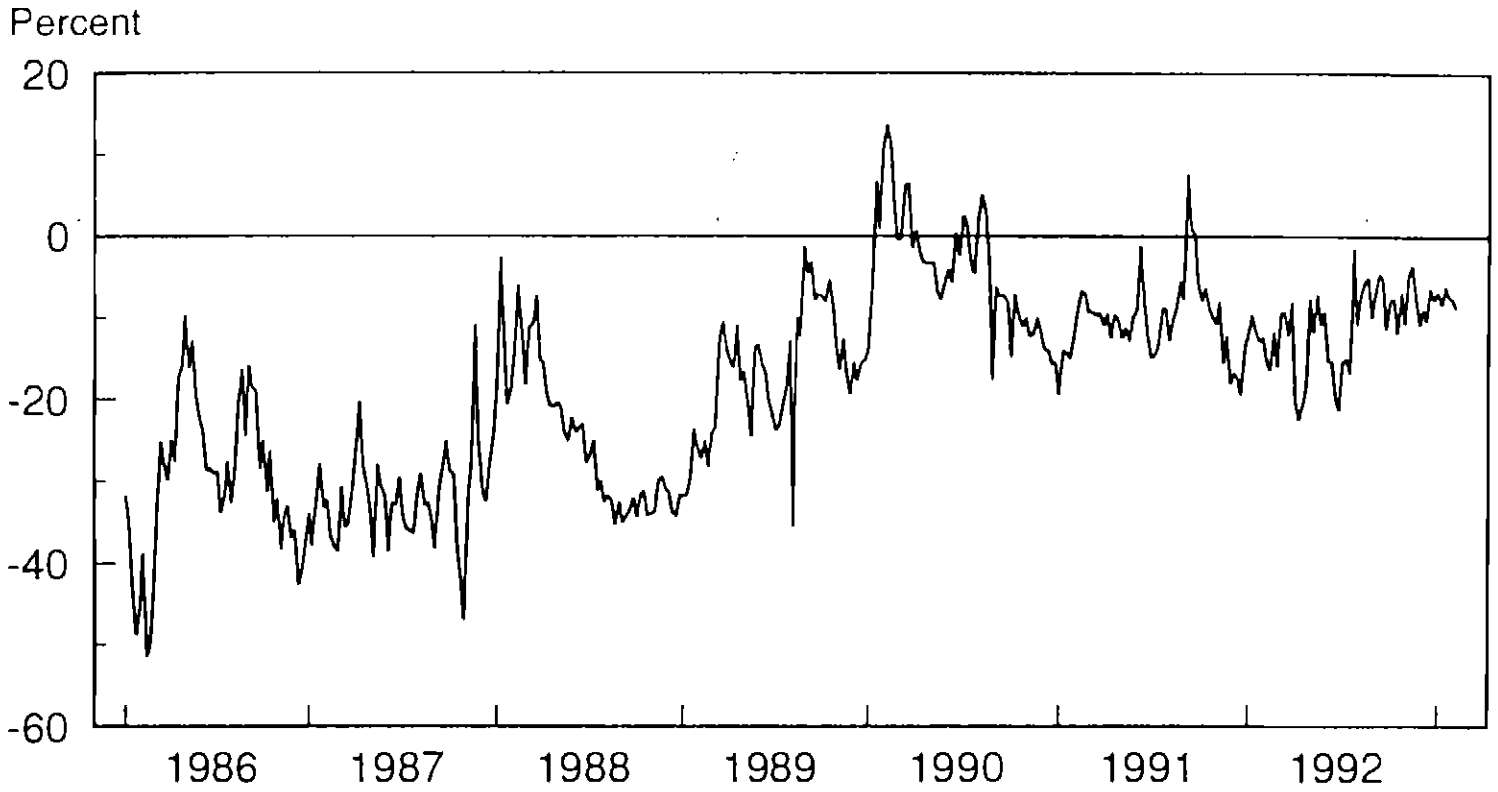
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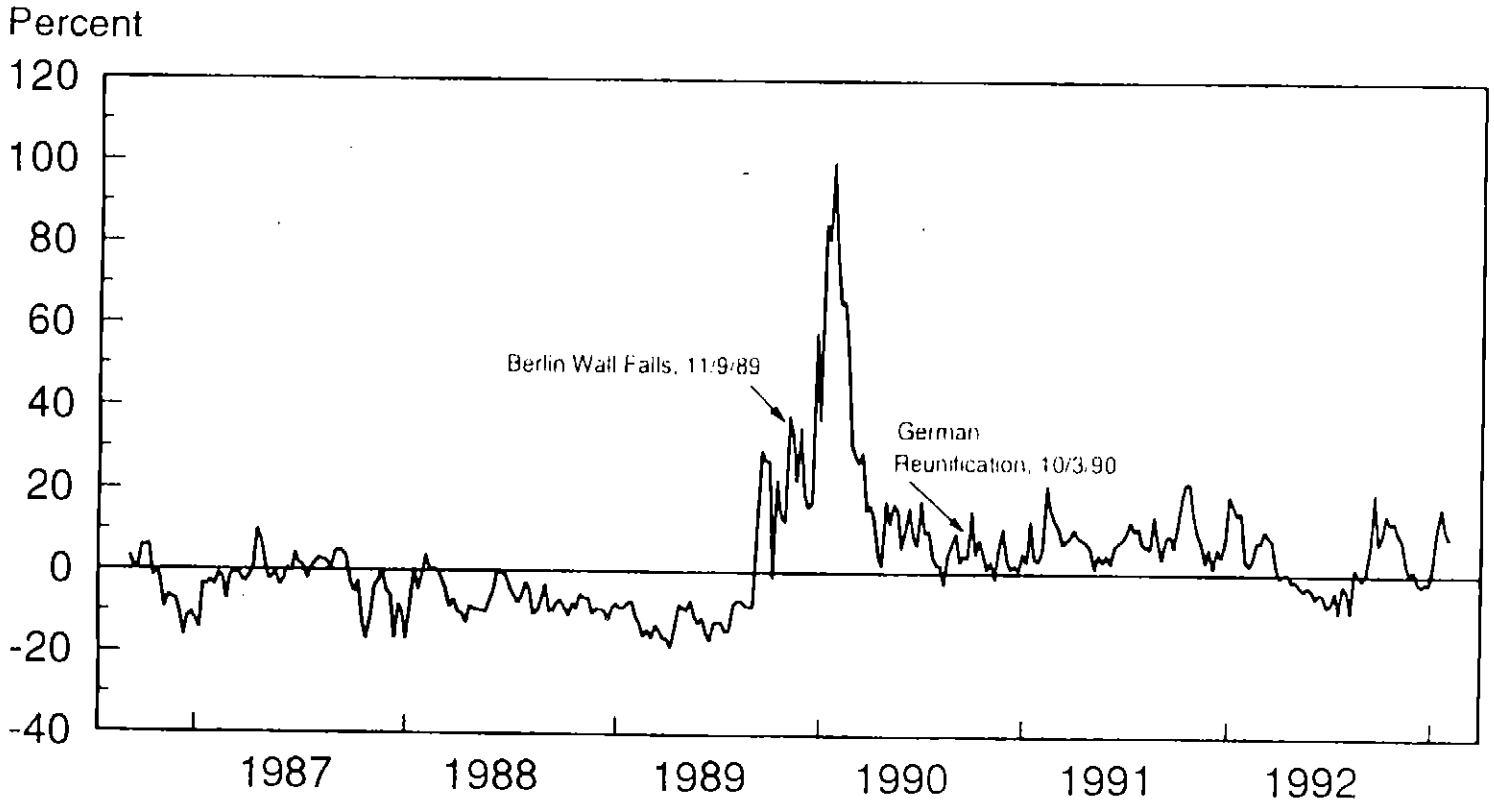
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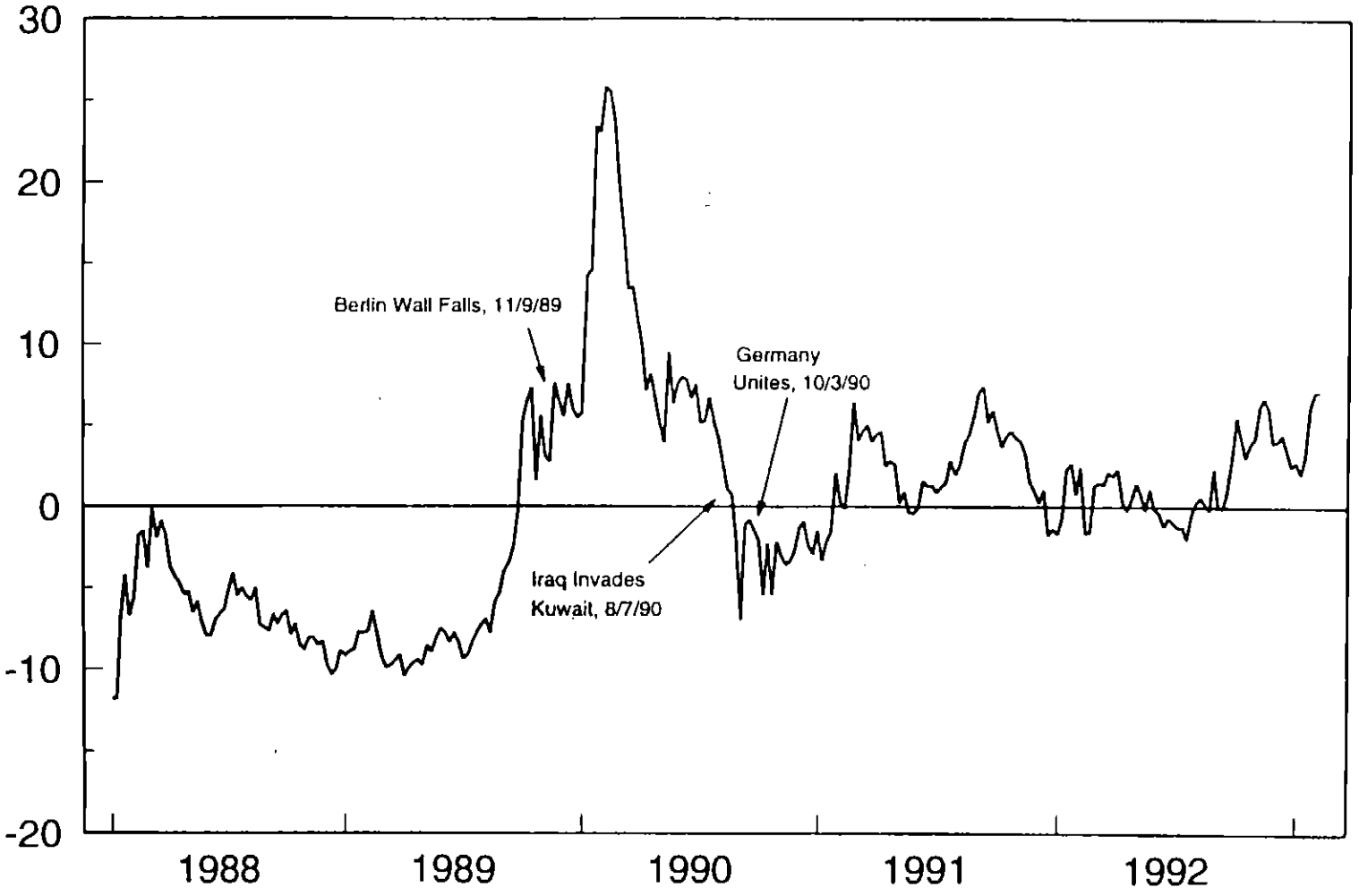
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