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Crises, Contagion, and the Closed-End Country Fund Puzzle

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This paper analyzes the behavior of closed-end country fund discounts, including evidence from the Mexican and East Asian crises. It finds that the ratio of fund prices to their fundamental value increases dramatically during a crisis, an anomaly that we denote the "closed-end country fund puzzle." Our results show that the puzzle relates directly to the fact that international investors are less (more) sensitive to changes in local (global) market conditions than domestic investors. This asymmetry implies that foreign participation in local markets can help dampen the effect of a crisis in asset prices in the originating country, at the cost of amplifying contagion to noncrisis countries. [JEL G1, E3]

The efficient market hypothesis states that assets ought to sell for their fundamental values. The fundamental value of a closed-end fund is the market value of its portfolio, the Net Asset Value (NAV). Hence, in theory, the price of closed-end funds should converge to the NAV. It is a well-documented fact, however, that closed-end funds trade at significant discounts or premiums. One of the prevalent explanations for this puzzle argues that, as the scope for arbitrage is limited due to capital account restrictions and transaction costs, the lack of convergence of fund

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prices to their fundamental value simply reflects the fact that investors in the local (NAV) and foreign (fund) markets differ.[1]

In this paper, we review the main stylized facts on closed-end country funds in light of an updated data set that includes the Asian crisis period. This allows us to provide a comprehensive characterization of the determination of discounts in crisis periods, study the dynamics of discounts in the aftermath of the Tequila crisis, and compare their behavior during both crises. We present evidence that indicates that investors' behavior indeed differs for both assets. By accepting this premise, the evolution of fund discounts can be used to shed light on the differential response of domestic and international investors to episodes of financial distress.

We find that the particular pattern displayed by Mexican funds during the 1994 crisis is common to other recent crisis episodes: the price to NAV ratio increases sharply during the initial phases of financial distress. We present evidence that this striking regularity, which we denote as the "closed-end country fund puzzle," can be attributed to the fact that, in general, international investors are less sensitive to changes in local market conditions than domestic investors (but they are more sensitive to changes in global market conditions). We show that, while the Asian crisis led to significant contagion across all emerging markets, channeled to a large extent through the behavior of international investors, the response from local investors differed. In Asia stock prices declined by more than fund prices (increasing fund premiums), but in Latin America stocks reflected the impact only partially, and hence Latin American fund discounts widened. Hence, substantial declines in local markets in crisis periods exert a less than proportional effect on fund prices, accounting for the sharp decrease in fund discounts. Conversely, a decline in international markets as a result of crises abroad affects fund prices relatively more than local share prices, widening the discount. Moreover, we find that this asymmetric response tends to be highly persistent and hence cannot be explained as a consequence of temporary information asymmetries.

The first policy implication that can be drawn from these results is that less responsive foreign investors may play a stabilizing role in a crisis country, while the opposite is true in contagion countries, where foreign investors are likely to amplify the negative cross effects from crisis economies. A second implication can be derived, according to whether we interpret the asymmetric response as an indication of foreign underreaction or local overreaction. In the first case, and assuming that local investors possess privileged information about local conditions, an increase in the discount may be understood as a signal of the deterioration of local fundamentals.

Instead, we tend to favor the view that crisis premiums reflect local overreaction in the presence of market segmentation. On the one hand, the excessive exposure of local investors to domestic market risk may make them more sensitive to changes in domestic fundamentals. On the other hand, the liquidity crunch that

[1]The way in which investors differ has been subject to some debate. Several explanations have been put forward with mixed results, including the presence of noise traders in the market for closed-end funds, the existence of asymmetric information across the two types of investors, and the higher loss aversion of foreign investors. See, among others, Lee, Shleifer, and Thaler (1991); Hardouvelis, La Porta, and Wizman (1993); Bodurtha, Kim, and Lee (1995); and Kramer and Smith (1995).

usually follows the unraveling of a financial crisis is likely to have a greater impact on investors in the host country, forcing them to liquidate their local positions at prices below their fundamental value. Therefore, countries that restrict foreign portfolio investment by preventing liquid international investors from operating in the local market may exacerbate the short-term impact of a financial crisis on asset values. Conversely, the presence of internationally diversified foreign investors may amplify contagion in otherwise healthy economies.

I. Definitions, Facts, and Puzzles

The Closed-End Fund Puzzle

Country funds are investment companies whose shares trade on organized stock exchanges and that hold and manage portfolios concentrating in the equity markets of particular foreign "host" countries. Among country funds, closed-end country funds (hereafter "country funds") are special funds that issue a fixed number of shares domestically, and thus ownership of the fund's shares after the initial public offering (IPO) can only be gained through the secondary market. Each fund provides two distinct market-determined prices: the country fund's share price quoted on the market where it trades and its NAV determined by the prices of the underlying shares traded in the "host" market.

Throughout the 1980s and 1990s, country funds experienced an impressive growth: in December 1984, only four country funds were listed on American stock exchanges, compared to more than 60 in 1998, in addition to more than 40 regional funds specializing in the equity markets of Asia, Europe, Latin America, or Africa. Over the same period, London and Hong Kong also emerged as important centers for country fund trading.

Country funds are popular among U.S.-based investors because they allow participation in foreign markets by providing a managed diversified portfolio at a low transaction cost and without the need to use foreign exchange for settlement purposes. They also avoid testing the liquidity of the normally thin host market by avoiding the redemption of shares. In fact, country funds were the original vehicle for foreign investment in emerging markets. For example, until the late 1980s the closed-end Mexico Fund was the only instrument available for U.S. investors to invest in the Mexican market. Similarly, the Korea Fund partially opened the Korean market to foreign investors in 1984, long before the process of capital market liberalization was initiated in 1991.

From the point of view of the host country, country funds can help promote the efficiency of pricing in the emerging capital market, and can enhance capital mobilization by local firms and reduce the cost of capital. Diwan, Errunza, and Senbet (1993a, 1993b) examine these issues both theoretically and empirically and show that these results hold despite the small size of the country fund compared with the market capitalization of the host market.

According to Stulz (1981), if capital markets were integrated internationally, assets of equal risk located in different countries would yield equal expected

returns in some common currency. Hence, prices of country funds should converge to the net asset value of the component assets if both were traded in an integrated market, and no premiums/discounts should be observed in the long run. However, it is a distinguishing feature of country funds that fund share prices generally deviate from their portfolio value or NAV and, as a result, the returns on fund shares may differ from those on the portfolio in which the fund invests. These premiums and discounts can be of significant size (for example, the Thai Fund traded at a premium of 160 percent in February 1998), and vary over time (the same fund traded at a discount of 20 percent in November 1994).

The significant discount that characterizes U.S. closed-end funds is what Lee, Shleifer, and Thaler (1991) denote as the "closed-end fund puzzle." Indeed, they present empirical evidence demonstrating that (1) U.S. closed-end funds start at a premium of about 10 percent; (2) after some time this premium turns into a discount; (3) the discount fluctuates widely over time; and (4) discounts shrink when funds are terminated through either liquidation or open-ending. Empirical studies on closed-end country funds, including Hardouvelis, La Porta, and Wizman (1993) and Bodurtha, Kim, and Lee (1995), have found that these funds largely follow the same pattern as U.S. closed-end funds. In particular, they found that, after controlling for restrictions to capital flows, closed-end country funds carry a significant discount on average.

Explanations for the Puzzle

The closed-end fund puzzle has generated an important amount of literature that tries to explain the size and time variation of fund discounts. Two main explanations have been put forward. The first one refers to the existence of market frictions and segmentation, while the second emphasizes the presence of nonrational agents and the role of market sentiment.

Market Frictions and Segmentation

The first line of explanation includes issues related to agency costs (if, for example, future portfolio performance is expected to be below average), differential tax treatment, barriers to cross-border capital flows, and the impossibility of perfect arbitrage (see Levy-Yeyati and Ubide, 1998, for a detailed discussion).[2]

If any or all of these barriers were actually in place, then the resulting market segmentation would imply that the price of a U.S.-based country fund is determined by the *diversification needs* of U.S. investors, whereas the valuation of the fund's NAV is determined by the diversification needs of investors in the host country (see Diwan, Errunza and Senbet, 1993a, for more information). In other words, the pricing of both assets will differ inasmuch as investors in either market use different benchmark portfolios to measure systematic risk.[3]

[2]Arbitrage could easily occur by taking over and liquidating or open ending the fund. However, managers resists these attacks (see Herzfeld, 1980) and in many cases funds include explicit provisions against takeovers.

[3]In all of the cases listed above, time variation of the discounts may arise from the evolution of any of these divergences (e.g., changes in restrictions of cross-border capital flows).

The Noise-Trader Hypothesis

The competing literature considers the mechanism of public trading as the main source of discounts. De Long and others (1990) emphasize the role of *noise traders*, irrational investors who interact in the market with fully rational investors and whose unpredictable beliefs create a risk in the pricing of assets that deters rational arbitrageurs from aggressively betting against them. They assume that variations in the demand from noise traders are caused by shifts in "sentiment" or "misperceptions" of the fundamental value of assets.[4] Lee, Shleifer, and Thaler (1991) argue, using a sample of U.S. equity closed-end funds, that the behavior of these funds is consistent with individual investors' systematic and persistent swings in sentiment, reflected in "common" changes of mood, and can be explained by the noise traders in De Long and others (1990). In this context, discounts are likely to arise because noise traders add excess volatility to the market and make it riskier to invest in the fund than to hold the underlying portfolio. Hence, the discount would reflect the differential risk and would vary over time along with the stochastic changes in the mood of noise traders. Hardouvelis, La Porta, and Wizman (1993) claim that the noise-traded hypothesis is likely to be a more adequate explanation for country fund discounts than for domestic closed-end fund discounts because country fund discounts would clearly reflect differences in sentiment between U.S. and host country investors, while different types of U.S. investors may be difficult to associate with particular types of assets. The implicit assumption of this approach is that the share of noise traders in the fund market is larger than in the host market.

The noise-trader hypothesis has further implications. Since the same sentiment drives discounts on all funds, there should be a common component in the evolution of the discounts of all funds traded in the same market. And since this sentiment is specific to the noise trader, it should affect other assets in the noise trader's portfolio. In the context of U.S. closed-end funds, Lee, Shleifer, and Thaler (1991) present evidence that sustains these claims and conclude that the discounts on closed-end funds are a sentiment index.[5]

Hardouvelis, La Porta, and Wizman (1993) and Bodurtha, Kim, and Lee (1995) test the noise-trader hypothesis for country funds and provide evidence suggesting that the mean reverting sentiment is an important component of the price of country funds and that there is a common component of sentiment across funds accounting for a significant fraction of the variance in country fund discounts. The authors of both studies also provide another important piece of evidence: country fund prices are sticky, that is, they do not respond as much as NAVs to movements in host stock markets, but they are oversensitive to movements in world and domestic (U.S.) returns. Finally, Bodurtha, Kim, and Lee

[4]Examples of noise traders are retail investors that follow the advice of financial gurus, or traders that follow positive feedback strategies or technical analysis.

[5]Chen, Kan, and Miller (1993) strongly criticize this result, claiming that, at best, the noise-trader hypothesis can account for only a minor part of the difference between fund prices and NAVs. This paper, as well as the response in Chopra and others (1993), proves that the debate on the closed-end fund puzzle is far from being closed.

(1995) argue in favor of the noise-trader hypothesis against the market segmentation view by showing that (1) discounts behave similarly across countries after controlling for different restrictions to capital flows; (2) discounts are stationary, with a gradual long-run adjustment of the price toward the NAV; and (3) fund prices overreact to important news and underreact to unimportant news.

Crisis, Contagion, and the "Closed-End Country Fund Puzzle"

All of the explanations listed above are based on analysis of country fund behavior in periods of relative tranquility.[6] However, the Mexican devaluation in December 1994 and the subsequent Tequila crisis added a new aspect to the picture. After the devaluation of the Mexican peso, country funds that invested in Mexico and other Latin American economies that were trading normally at a discount developed large premiums that were sustained for as long as four months, introducing what we refer to in this paper as the "closed-end country fund puzzle"(see Figures 1, 2, and 3).[7] How can this be explained by the theories advanced thus far?

As Kramer and Smith (1995) suggest, the noise-trader hypothesis encounters two fatal difficulties in explaining the Mexican episode: first, it would imply that U.S. investors became relatively *optimistic* after the devaluation about Mexican stocks; second, for this hypothesis to be true, swings in sentiment would then be common to all funds. After the Mexican devaluation, however, only Mexico and a few Latin American country funds experienced these swings. Hence, sentiment changes were not systematic, but rather country-specific, contradicting the standard noise-trader argument.

Kramer and Smith (1995) advance an alternative explanation for this behavior based on loss aversion by American investors. Borrowing from the model by Benarzti and Thaler (1995), Kramer and Smith argue that movements in the NAV should be followed by asymmetric effects in discounts, with upswings showing smaller changes in prices relative to NAV than downswings. In particular, loss averse shareholders should be reluctant to sell on downswings to avoid realizing losses. Hence, in the Mexican case, American shareholders would have been unwilling to sell after the decline in NAVs that followed the devaluation of the peso, hoping for a market turnaround, thus giving rise to large premiums.[8]

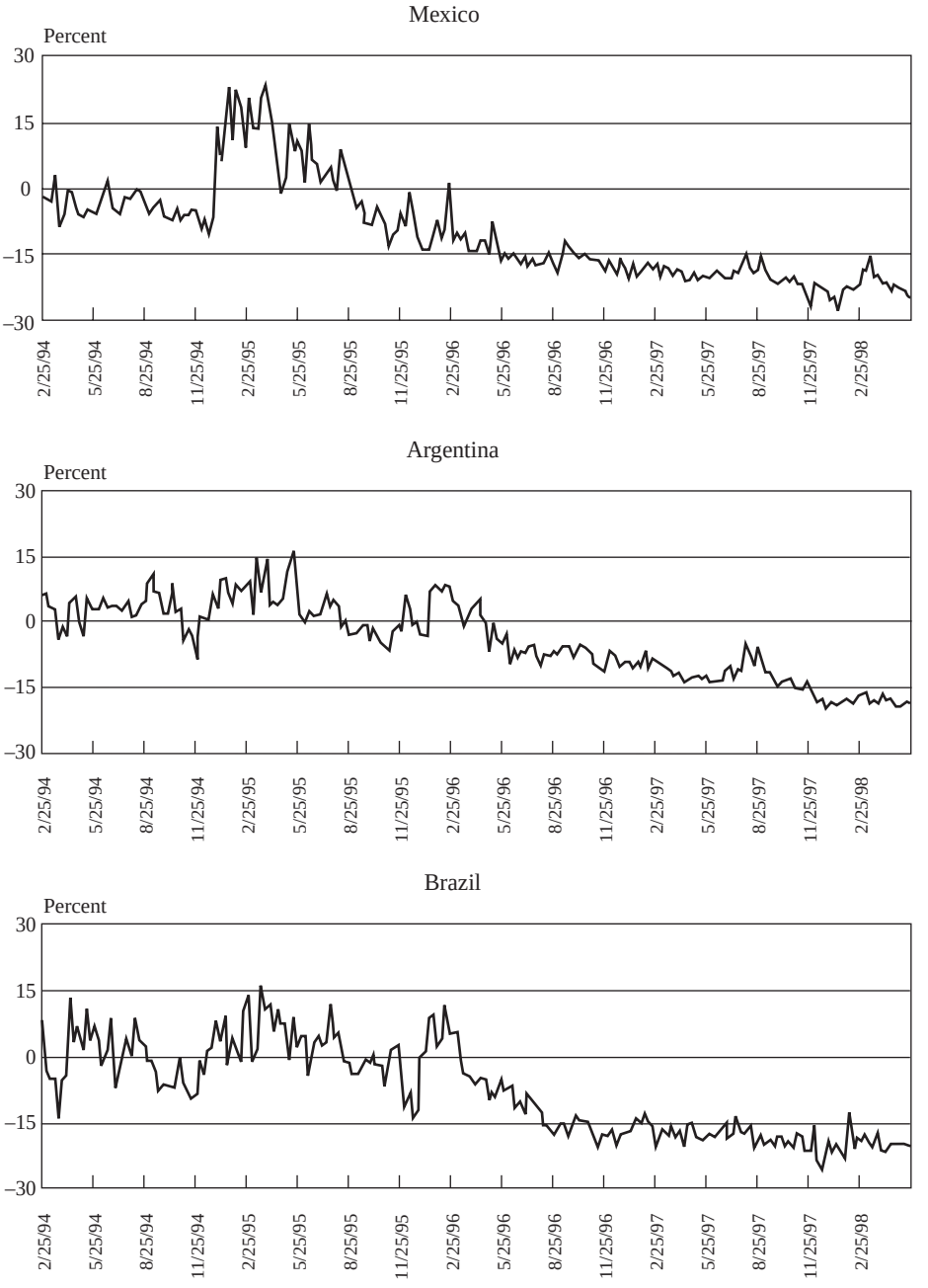
Frankel and Schmukler (1996) argue that the developments following the Mexican crisis were consistent with swings in market sentiment, provided that local investors turned pessimistic earlier than U.S. investors. Their argument relies on the assumption that Mexican investors had access to privileged information about the local market, and thus were the first ones to foresee the crisis. Relatively uninformed American investors lagged behind, inducing an increase in the premium.

[6]Their sample does not include any major crisis in emerging markets.

[7]As Figure 2 shows, this pattern also appeared in Asian country funds during the 1997 crisis.

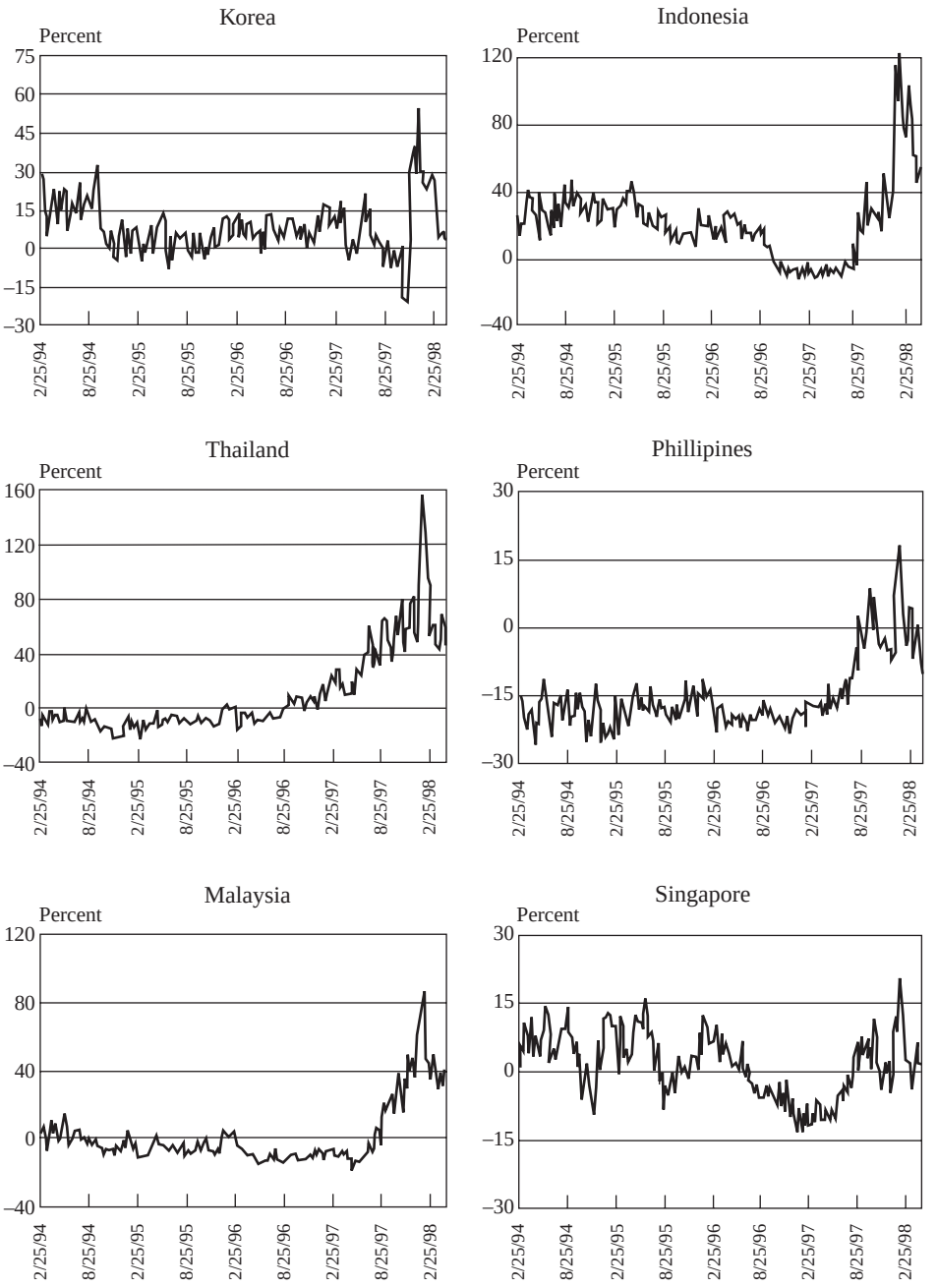
[8]Naturally, the underlying assumption is that Mexican investors are at least less loss averse than U.S. investors.

Figure 1. Latin America: Evolution of Discounts



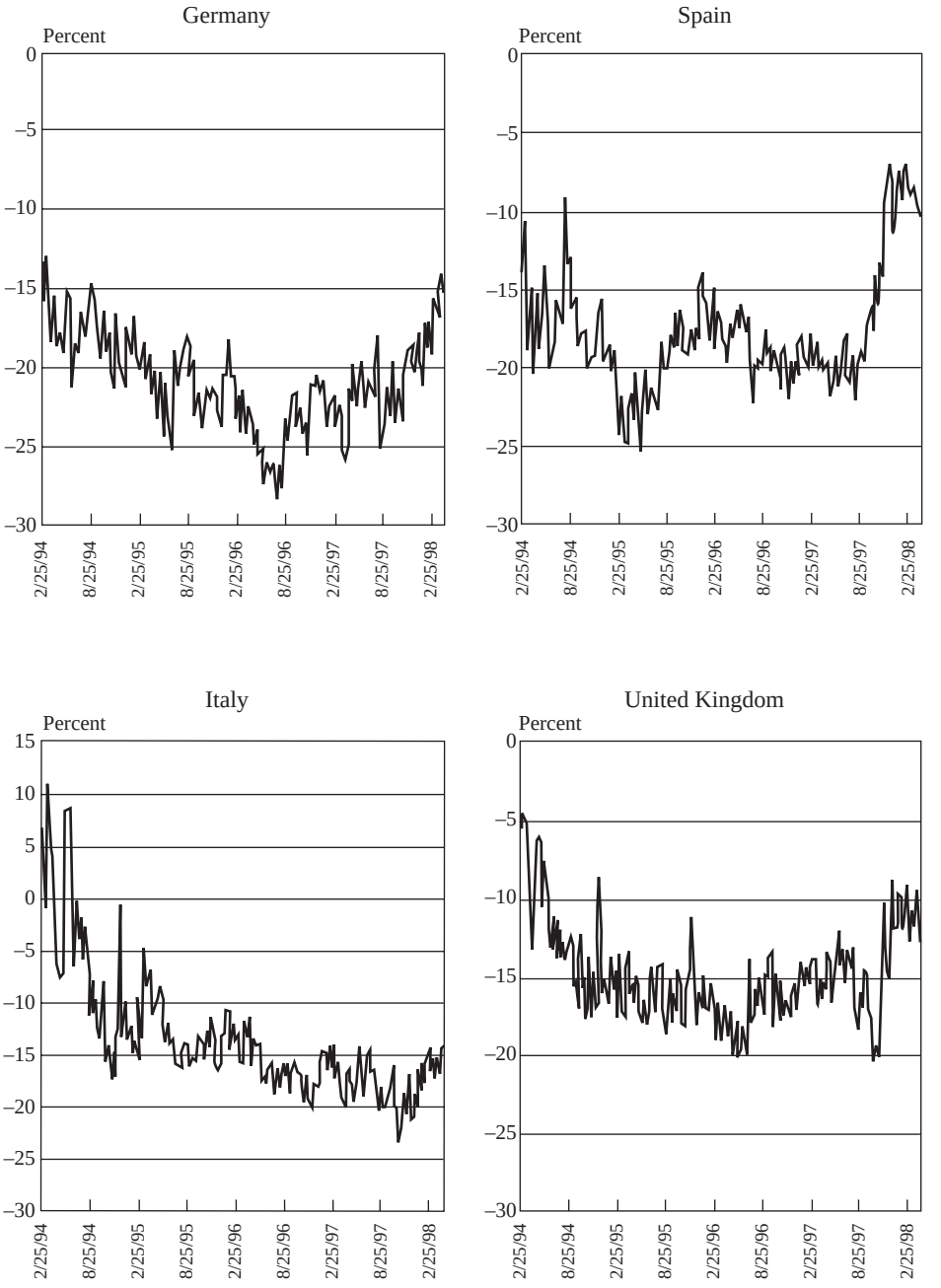
Source: Bloomberg.

Figure 2. Asia: Evolution of Discounts



Source: Bloomberg.

Figure 3. Europe: Evolution of Discounts



Source: Bloomberg.

Several aspects of this explanation are difficult to reconcile with the recent evidence. First, temporary information asymmetries like the ones assumed in Frankel and Schmukler (1996) cannot account for long-lasting premiums. In particular, it is difficult to understand why U.S. investors remained uninformed of the seriousness of the Mexican crisis until as late as March 1995, when the Mexican Fund still posted a premium of more than 20 percent. Second, both the standard market sentiment and the asymmetric information hypotheses imply that discounts are stationary, that is, the premium during the crisis period would eventually revert to a discount of the same order prevalent before the crisis.[9] Already in mid-1995, however, the Mexican Fund traded at a discount significantly larger than its precrisis average, reaching values above –20 percent by the end of 1997.[10]

But while there is no evidence of significant changes in the degree of market segmentation (e.g., regulatory restrictions or transaction costs) that could explain the behavior of country fund discounts during crisis periods, persistent shifts in relative asset valuation as those indicated by the empirical evidence presented here are still consistent with the market segmentation hypothesis. There are two components to the valuation of assets: expected cash flow projections and an appropriate (stochastic) discount factor. While a downward shift in the cash flow projections would affect valuations of local as well as international investors by a similar proportion, leaving relative valuations unaffected, crisis premiums could be explained if a crisis also involves differential changes in *discount factors* by local and international investors.[11] The underlying reasons for these changes, however, have to account for the fact that discounts tend to move in the opposite direction in markets suffering from contagion, as was the case of Latin American countries in the aftermath of the Asian crisis. This will become clear in the next section, where we revisit some of the ideas discussed above in light of the empirical evidence from recent years.

II. Empirical Evidence

In this section we focus on the behavior of country funds in periods of crisis. We distinguish three types of emerging markets, according to their situation during the Asian crisis: (1) crisis markets (the group Asia I, comprising Indonesia, Korea, and Thailand); (2) near-crisis markets, which are subject to contagion from a crisis in a neighboring country (the group Asia II, which includes Malaysia, the Philippines, and Singapore); and (3) noncrisis markets (the Latin American group: Argentina, Brazil, Chile, and Mexico). For countries in the first group, the deterioration of local market conditions is apparent and should be part of the information set of both

[9]The former, because noise traders' misperceptions of the fundamental value are assumed to be mean reverting; the latter because foreign investors will ultimately determine the correct investment scenario and will cease to lag behind local insiders.

[10]As the evidence presented in the next section shows, this was also the case for other Latin American country funds.

[11]We are grateful to an anonymous referee for pointing out the relation between this argument and our interpretation of the empirical findings in Section IV.

local and foreign investors.[12] The second group of Asian countries have fundamental links with crisis countries, and thus are likely to suffer negative spillovers. Contagion in these cases is expected and may be consistent with the evolution of fundamentals (fundamental contagion). Finally, fundamentals in Latin American countries (and in general, non-Asian emerging markets) are less affected by the collapse of Asian economies, and contagion, if there is any, is likely to respond to non-fundamental factors and, in particular, to swings in investor sentiment toward emerging markets as a whole. In addition, in some cases we use as a benchmark a fourth group of European countries (including Germany, Ireland, Italy, Spain, and the United Kingdom). As will be shown below, the behavior of country fund prices vis-à-vis the price of the underlying stock varies substantially across each of these groups. Finally, in some cases, we divide the sample period (2/1994–4/1998) into two subsamples, corresponding broadly to the Tequila (2/1994–7/1996) and the Asian (8/1996–4/1998) crises.[13]

The Data

The full sample used in our empirical analysis comprise 24 single-country funds traded on the New York Stock Exchange. Table 1 lists the names and IPO of the funds in our sample. The data cover weekly prices, NAVs, and discounts for the period February 1994 to April 1998 and were obtained from the Bloomberg database. Prices and NAVs are generally reported on a Friday. The funds compute the NAVs by translating the local currency price of the assets of the portfolio at the local market close into U.S. dollars. This currency conversion, however, is not uniform, because some funds use the market exchange rate at closing in the local market while others use the afternoon rate in New York. Moreover, since foreign markets close at different hours prior to the close in New York, prices and NAVs are only approximately synchronous.

First Glance at the Main Statistics

Table 2 presents summary statistics on fund discounts for the entire sample (throughout the paper, discounts are computed as the ratio of fund prices to NAVs). Several results stand out. First, country funds trade at an average discount of –5.7 percent, and this discount varies importantly over time and across countries. The average standard deviation is 9 percent, from a low of 3 percent for Germany to a high of 30 percent for Thailand. The values for Thailand, however, range from –22 percent to 155 percent. Third, discounts are very persistent, with first-order autocorrelation coefficients of about 0.9. Finally, the behavior across regions shows important idiosyncrasies. On the one hand, Organization for Economic Cooperation and Development (OECD) countries trade on average at a

[12]Among other things, the implementation of an IMF program in these three countries entailed the disclosure of a substantial amount of previously private information.

[13]We chose as the cutoff point the beginning of August 1996, when the Thai Fund discount turned into a premium. The sample period notation is month/year.

larger discount, and some of them have never traded at a premium (Germany, Ireland, Spain, and the United Kingdom). These countries also display the lowest volatility, with an average standard deviation of 5 percent. On the other hand, Asian countries have traded on average at a premium. This reflects in part the behavior of some of these funds during the recent crisis.[14] To control for this fact, in Table 3 we present the same statistics for the Tequila crisis and the Asian crisis subsamples.

During the Tequila crisis, Latin American funds traded on average at a small discount of less than –4 percent, with Mexico reaching a maximum premium of 43 percent, while in the Asian crisis subsample, the average discount for the region was –17.4. Asian funds showed the opposite behavior. While they traded at an average discount of close to –2 percent during the earlier period, the average discount turned into an average premium of 8.5 percent during the Asian crisis, with maximums of more than 100 percent for Indonesia and Thailand.[15] Hence, the evidence confirms an important stylized fact: regardless of its behavior in periods of tranquility, fund discounts in countries directly affected by a major financial crisis decrease dramatically and even turn to premiums for long periods of time.

Levy-Yeyati and Ubide (1998) report also the main statistics for the first differences of prices and NAVs. Consistent with standard findings in the literature, they show that returns on prices are more volatile than returns on NAVs over the entire sample and that returns on prices are negatively autocorrelated.

Are Crisis Premiums an Indication of Causality?

As mentioned in the introduction, country fund discounts have been used to support the hypothesis that local investors initiated the downward spiral in stock market prices during the Mexican crisis, based on evidence suggesting that NAVs may have started to decline earlier than fund prices. Before testing this hypothesis in the context of the Asian crisis, we revisit the evidence from the Mexican crisis in light of what has been discussed so far in the paper. More precisely, we look at the movement of the price and the NAV of the Mexican Fund vis-à-vis the behavior of the Mexican stock market index through a window that covers five weeks before and after the crisis, and we then proceed to compute Granger causality tests between prices, NAVs, and other relevant variables.[16] As Figure 4 shows, there seems to be little indication of an anticipating behavior from local investors: in the two weeks leading up to the devaluation, all three variables,

[14]Note, for example, the excess skewness and kurtosis for countries such as Indonesia, Korea, Malaysia, Mexico, and Thailand.

[15]Funds in Indonesia, Korea, Singapore, and Taiwan Province of China traded at an average premium, probably reflecting the existence of barriers to foreign investment that made these funds particularly attractive.

[16]In the remaining section, we focus our analysis on the older country fund per country. The Mexican Fund (MFX) is the older and larger of the three Mexican closed-end country funds in operation and has been shown to lead the behavior of the other two (see Frankel and Schmukler, 1996). A similar picture is obtained, however, from either the observation of the performance of, or the application of Granger causality tests to, the other two Mexican funds.

Table 1. Sample of Country Funds

Country	Date of IPO	Capitalization (in millions of U.S. dollars)[a]
Argentina (AF)	November 11, 1991	126.9
First Australia (FAX)	December 12, 1985	1426.8
Brazil (BZF)	March 31, 1988	425.9
Chile (CH)	September 26, 1989	366.5
New Germany (GF)	January 30, 1990	442.2
Indonesia Fund (IF)	March 1, 1990	44.4
Irish Investment (IRL)	March 1, 1990	76.4
First Israel (ISL)	February 1, 1990	65.8
Italy Fund (ITA)	February 2, 1986	101.1
Japan OTC (JOF)	March 14, 1990	69.7
Korea Fund (KF)	August 22, 1984	511.4
Malaysia Fund (MF)	May 8, 1987	208.9
Mexican Fund (MXF)	June 3, 1981	931.1
First Philippine (FPF)	November 8, 1989	215.5
Portugal Fund (PGF)	November 3, 1989	77.8
Singapore Fund (SGF)	July 24, 1990	118.9
New South Africa (SOA)	January 1, 1991	551.6
Growth Fund of Spain (GSP)	February 14, 1990	196.3
Taiwan Fund (TWN)	December 16, 1983	423.9
Thai Fund (TTF)	February 17, 1988	197.5
Turkish Investment (TKF)	December 1, 1989	44.1
United Kingdom Fund (UKM)	September 5, 1987	63.8

Source: Bloomberg.
[a]As of April 1997.

expressed in dollars, fluctuated erratically up to the devaluation week, to decline *pari passu* with the exchange rate thereafter.[17] Thus, the decline in NAVs could be accounted for entirely by the decline in dollar values brought about by the December 20 devaluation. This impression is confirmed by the results of two versions of Granger causality tests: a standard pairwise test, and a test controlling for past changes in all the explanatory variables using the following equation:

$$X = \alpha + \Sigma_i^2 \beta_{1,i} P_{t-I} + \Sigma_i^2 \beta_{2,i} NAV_{t-I} + \Sigma_i^2 \beta_{3,i} STR_{t-I} + \Sigma_i^2 \beta_{4,i} ER_{t-I} + \beta_5 DIS_{t-1}, \qquad (1)$$

where *P* represents returns on fund shares; *STR*, the local stock market index; *ER*, changes in the exchange rate; and *DIS*, the fund discount. *X* stands alternative for the variables *P*, *NAV*, and *STR*.[18] Thus, if, as we expect, crisis-driven

[17]Indeed, local currency stock prices increased during the devaluation week.

[18]In all cases, as well as in the causality tests reported below, with the exception of discounts, log differences of the variables were always used. In the paper, we only report results of two-lag tests. However, tests with a larger number of lags were run without any substantial variation in the findings.

Table 2. Discounts: Summary Statistics—Whole Sample, 2/1994 to 4/1998[a]

	Mean	STD	Skewness	Levels Kurtosis	Min	Max	Auto-correlation
Argentina	–4.04	8.60	–0.06	–1.01	–19.55	15.72	0.94
	(1.48)	(1.86)	(0.51)	(0.97)			
Brazil	–8.06	10.12	0.27	–1.23	–25.87	14.17	0.91
	(1.71)	(1.41)	(0.48)	(0.91)			
Chile	–11.16	5.80	0.84	0.74	–21.57	7.75	0.93
	(0.91)	(2.08)	(0.47)	(0.87)			
Mexico	–6.67	15.44	1.07	0.32	–25.03	43.12	0.97
	(2.70)	(5.61)	(0.54)	(1.05)			
Mexico	–10.13	11.24	0.93	0.30	–30.04	23.09	0.94
	(1.92)	(3.91)	(0.50)	(0.96)			
Latin America	–8.01	10.24	0.61	–0.18	–24.41	20.77	0.94
Indonesia	6.25	20.89	2.47	6.53	–15.01	102.85	0.94
	(3.58)	(13.30)	(0.50)	(0.95)			
Korea	9.70	9.47	1.06	3.00	–17.69	56.96	0.84
	(1.40)	(3.82)	(0.31)	(0.55)			
Malaysia	1.09	17.95	2.16	4.69	–16.23	88.60	0.96
	(3.10)	(10.38)	(0.52)	(0.99)			
Philippines	–15.37	7.63	1.85	3.41	–25.80	18.90	0.91
	(1.27)	(3.69)	(0.45)	(0.83)			
Singapore	1.32	6.78	–0.07	–0.78	–12.83	20.55	0.87
	(1.09)	(1.32)	(0.40)	(0.72)			
Taiwan	–2.31	14.57	0.11	–1.26	–29.18	24.50	0.96
	(2.51)	(2.71)	(0.52)	(0.98)			
Thailand	8.88	30.99	1.89	3.98	–21.78	155.42	0.97
	(5.32)	(15.02)	(0.51)	(0.96)			
Asia	1.37	15.47	1.35	2.80	–19.79	66.83	0.92
Australia	–2.57	6.53	0.81	0.15	–15.23	15.94	0.94
	(1.11)	(2.39)	(0.48)	(0.91)			
Germany	–20.68	3.10	0.13	–0.39	–28.30	–12.97	0.83
	(0.50)	(0.71)	(0.40)	(0.72)			
Ireland	–13.53	4.20	0.63	–0.11	–23.24	–1.72	0.8
	(0.63)	(0.81)	(0.33)	(0.57)			
Italy	–13.47	6.09	1.73	3.13	–22.76	10.92	0.89
	(1.01)	(2.82)	(0.45)	(0.82)			
Japan	5.95	8.76	0.47	–0.31	–9.81	33.30	0.86
	(1.42)	(1.71)	(0.42)	(0.76)			
Portugal	–13.33	7.18	1.08	0.72	–24.53	8.52	0.92
	(1.21)	(2.57)	(0.47)	(0.88)			
Spain	–18.14	3.74	1.30	1.57	–25.13	–7.04	0.91
	(0.62)	(1.71)	(0.46)	(0.84)			
United Kingdom	–15.28	3.19	1.11	1.40	–20.83	–3.92	0.8
	(0.50)	(1.13)	(0.37)	(0.64)			
OECD	–11.38	5.35	0.91	0.77	–21.23	5.38	0.87
Israel	–6.80	13.00	0.95	–0.36	–24.91	26.35	0.97
	(2.28)	(4.58)	(0.55)	(1.08)			
South Africa	–17.91	4.48	2.60	9.09	–24.22	6.34	0.9
	(0.75)	(2.79)	(0.46)	(0.84)			
Turkey	9.01	22.86	1.32	1.62	–19.68	100.26	0.94
	(3.95)	(9.61)	(0.52)	(1.00)			
Emerging Markets	–6.92	9.03	1.36	3.24	–24.57	16.35	0.94
Average	–5.74	10.63	0.99	1.32	–21.92	31.51	0.91

Source: Bloomberg.
Note: Newey-West Standard Errors in parentheses.
[a]Sample period notation is month/year.

Table 3. Discounts: Summary Statistic—Subsamples

	Tequila Crisis (2/1994–8/1996)[a]					
	Mean	STD	Skewness	Kurtosis	Min	Max
Argentina	0.54	5.94	0.02	–0.76	–10.92	15.72
	(1.06)	(1.24)	(0.43)	(0.77)		
Brazil	–3.15	8.41	–0.17	–0.85	–20.44	14.17
	(1.51)	(2.09)	(0.45)	(0.80)		
Chile	–9.61	5.83	0.81	0.51	–19.69	7.75
	(1.09)	(2.23)	(0.52)	(0.96)		
Mexico	–0.76	15.37	0.67	–0.24	–21.88	43.12
	(1.99)	(5.43)	(0.59)	(1.13)		
Mexico	–5.33	10.45	0.76	0.16	–30.04	23.09
	(1.95)	(3.70)	(0.51)	(0.95)		
Latin America	–3.66	9.20	0.42	–0.24	–20.59	20.77
Indonesia	2.24	7.03	–0.03	–0.36	–14.38	20.97
	(1.27)	(1.87)	(0.46)	(0.82)		
Korea	8.98	6.90	0.78	0.58	–5.15	30.80
	(1.17)	(2.08)	(0.37)	(0.65)		
Malaysia	–5.30	5.68	0.67	–0.17	–13.95	12.80
	(1.02)	(1.64)	(0.44)	(0.79)		
Philippines	–18.76	2.74	0.07	–0.31	–25.80	–12.09
	(0.37)	(0.45)	(0.25)	(0.45)		
Singapore	2.68	5.98	–0.10	–1.01	–9.41	14.55
	(1.06)	(1.04)	(0.43)	(0.76)		
Taiwan	5.11	11.18	–0.19	–1.03	–20.74	24.50
	(2.08)	(1.73)	(0.50)	(0.92)		
Thailand	–8.31	6.02	0.34	0.17	–21.78	6.10
	(1.12)	(2.22)	(0.50)	(0.93)		
Asia	–1.91	7.15	0.30	–0.29	–14.21	17.75
Australia	–1.62	7.49	0.47	–0.71	–15.23	15.94
	(1.44)	(2.38)	(0.56)	(1.07)		
Germany	–20.75	3.23	0.02	–0.51	–28.30	–12.97
	(0.59)	(0.86)	(0.49)	(0.89)		
Ireland	–13.23	4.43	0.66	–0.38	–23.24	–1.72
	(0.79)	(0.88)	(0.44)	(0.79)		
Italy	–11.60	6.43	1.48	1.80	–19.84	10.92
	(1.18)	(2.88)	(0.49)	(0.89)		
Japan	5.23	8.98	0.56	–0.13	–9.81	33.30
	(1.67)	(2.15)	(0.50)	(0.93)		
Portugal	–10.78	7.28	0.71	0.12	–23.18	8.52
	(1.36)	(2.56)	(0.51)	(0.94)		
Spain	–18.01	3.49	1.48	2.21	–25.13	–7.04
	(0.66)	(1.84)	(0.54)	(1.00)		
United Kingdom	–15.49	3.38	1.43	1.92	–20.66	–3.92
	(0.60)	(1.58)	(0.44)	(0.78)		
OECD	–10.78	5.59	0.85	0.54	–20.67	5.38
Israel	–1.59	12.57	0.62	–1.06	–18.60	26.35
	(2.46)	(3.75)	(0.61)	(1.18)		
South Africa	–17.86	5.35	2.21	5.63	–24.22	6.34
	(1.02)	(3.29)	(0.54)	(1.02)		
Turkey	17.84	22.46	1.15	1.14	–11.43	100.26
	(4.30)	(9.37)	(0.56)	(1.05)		
Emerging Markets	–0.54	13.46	1.33	1.90	–18.08	44.32
Average	–4.56	7.75	0.57	0.20	–18.62	16.71

Table 3. *(concluded)*

	Asian Crisis (8/1996–4/1998)[a]					
	Mean	STD	Skewness	Kurtosis	Min	Max
Argentina	–13.91	3.78	0.24	–1.00	–19.55	–5.28
	(0.97)	(0.47)	(0.74)	(1.41)		
Brazil	–18.67	2.44	–0.14	0.32	–25.87	–13.28
	(0.46)	(0.58)	(0.35)	(0.64)		
Chile	–14.49	4.10	0.38	–1.09	–21.57	–6.09
	(1.05)	(1.11)	(0.73)	(1.36)		
Mexico	–19.45	2.23	–0.07	–0.26	–25.03	–14.52
	(0.51)	(0.75)	(0.49)	(0.87)		
Mexico	–20.50	2.43	–0.32	0.09	–27.33	–15.21
	(0.55)	(0.44)	(0.50)	(0.88)		
Latin America	–17.40	3.00	0.02	–0.39	–23.87	–10.88
Indonesia	14.89	34.26	1.04	–0.29	–15.01	102.85
	(8.97)	(14.19)	(0.79)	(1.53)		
Korea	11.26	13.38	0.70	0.85	–17.69	56.96
	(3.16)	(6.22)	(0.55)	(1.00)		
Malaysia	14.90	25.99	0.62	–0.57	–16.23	88.60
	(6.76)	(6.74)	(0.77)	(1.48)		
Philippines	–8.05	9.48	0.60	–0.44	–21.60	18.90
	(2.35)	(1.65)	(0.65)	(1.20)		
Singapore	–1.61	7.49	0.42	–0.51	–12.83	20.55
	(1.87)	(1.36)	(0.66)	(1.22)		
Taiwan	–18.33	4.89	0.21	–0.05	–29.18	–6.28
	(1.19)	(0.82)	(0.61)	(1.11)		
Thailand	46.00	30.64	1.33	2.40	6.70	155.42
	(7.42)	(11.46)	(0.60)	(1.09)		
Asia	8.44	18.02	0.70	0.20	–15.12	62.43
Australia	–4.61	2.81	0.21	–1.01	–9.38	1.44
	(0.64)	(0.68)	(0.50)	(0.88)		
Germany	–20.52	2.80	0.58	–0.35	–25.61	–13.81
	(0.66)	(0.95)	(0.57)	(1.00)		
Ireland	–14.16	3.61	0.22	–0.05	–21.64	–5.49
	(0.72)	(1.00)	(0.38)	(0.68)		
Italy	–17.52	2.07	–0.29	–0.74	–22.76	–13.92
	(0.43)	(0.33)	(0.41)	(0.73)		
Japan	7.48	8.10	0.38	–0.80	–7.84	27.26
	(1.96)	(1.80)	(0.61)	(1.10)		
Portugal	–18.84	2.00	–0.20	–0.29	–24.53	–14.84
	(0.37)	(0.27)	(0.33)	(0.62)		
Spain	–18.41	4.25	1.09	0.60	–25.13	–7.11
	(1.07)	(2.01)	(0.68)	(1.26)		
United Kingdom	–14.84	2.72	0.04	–0.42	–20.83	–9.18
	(0.63)	(1.01)	(0.53)	(0.93)		
OECD	–12.68	3.55	0.25	–0.38	–19.72	–4.46
Israel	–18.06	2.72	0.57	1.67	–24.91	–8.54
	(0.56)	(0.58)	(0.41)	(0.73)		
South Africa	–18.02	1.34	0.04	–0.58	–20.93	–14.54
	(0.24)	(0.19)	(0.33)	(0.61)		
Turkey	–10.05	5.50	0.10	–0.89	–19.68	2.80
	(1.34)	(0.72)	(0.63)	(1.15)		
Emerging Markets	–15.38	3.19	0.23	0.07	–21.84	–6.76
Average	–8.31	7.51	0.33	–0.18	–19.89	12.61

Source: Bloomberg.
Note: Newey-West Standard Errors in parentheses.
[a]Sample period notation is month/year.

Figure 4. The Mexican Fund (MFX)

Source: Bloomberg.

changes are channeled primarily through the local stock market, causality should run directly from *STR*, rather than NAVs, to fund prices. More important, by including exchange rate movements we test the hypothesis that movements in the local stock market anticipated the devaluation.

A rapid inspection of the results, presented in Table 4, suggests that the behavior of fund and stock prices responded to a large extent to movements in the exchange rate, contradicting the hypothesis of local anticipation; and this response was channeled through the local stock market before reflecting completely in both fund prices and NAVs.

In principle, the last point is consistent with the claim in Frankel and Schmukler (1996) that local investors reacted earlier than foreigners, as changes in the stock market index seemed to have preceded changes in fund prices. But this link between causality and the evolution of discounts does not carry on to the Asian crisis, as we show next.

We conducted two versions of the causality test using data from the Asian crisis period. We ran pairwise Granger causality tests of fund prices, NAVs, local stock market indices, and the Morgan Stanley Capital Index (MSCI), to proxy for a global common component driving contagion through the international financial

Table 4. The Mexican Fund During the Tequila Crisis: Causality Tests

Null Hypothesis	Test Result
NAV does not Granger-cause price	4.61**
Price does not Granger-cause *NAV*	3.70**
STR does not Granger-cause *NAV*	9.15***
NAV does not Granger-cause *STR*	1.19
STR does not Granger-cause price	7.57***
Price does not Granger-cause *STR*	0.54
ER does not Granger-cause *STR*	4.55**
STR does not Granger-cause *ER*	1.79
$P = \alpha + \Sigma_i^2 \beta_{1,i} P_{t-I} + \Sigma_i^2 \beta_{2,i} NAV_{t-I} + \Sigma_i^2 \beta_{3,i} STR_{t-I} + \Sigma_i^2 \beta_{4,i} ER_{t-1} + \beta_5 DIS_{t-I}$	
$\beta_{2,i} = 0$	7.07**
$\beta_{3,i} = 0$	11.23***
$NAV = \alpha + \Sigma_i^2 \beta_{1,i} P_{t-I} + \Sigma_i^2 \beta_{2,i} NAV_{t-I} + \Sigma_i^2 \beta_{3,i} STR_{t-I} + \Sigma_i^2 \beta_{4,i} ER_{t-1} + \beta_5 DIS_{t-I}$	
$\beta_{3,i} = 0$	13.43***
$STR = \alpha + \Sigma_i^2 \beta_{1,i} P_{t-I} + \Sigma_i^2 \beta_{2,i} NAV_{t-I} + \Sigma_i^2 \beta_{3,i} STR_{t-I} + \Sigma_i^2 \beta_{4,i} ER_{t-1} + \beta_5 DIS_{t-I}$	
$\beta_{4,i} = 0$	9.59***

Note: * means significant at the 1 percent level, ** at the 5 percent level, and *** at the 10 percent level.

markets.[19] In addition, to test for the existence of a regional component, for the Asian II and the Latin American subsamples we estimated the following SUR model:

$$X = \alpha + \Sigma_i^2 \beta_{1,i} P_{t-I} + \Sigma_i^2 \beta_{2,i} NAV_{t-I} + \Sigma_i^2 \beta_{3,i} STR_{t-I} + \Sigma_i^2 \beta_{4,i} MSCI_{t-I} + \Sigma_i^2 \beta_{5,i} CFIW_{t-I} + \beta_6 DIS_{t-1}, \quad (2)$$

for $I = 1, 2$, where, as before, X represents, in turn, variables P, *NAV*, and *STR*; while *CFIW* is a country fund price index.[20] Finally, for each individual crisis country (Asia I sample), we ran the following regression:

[19]Several other variables were tested in this role, among them a global index and regional subindices of country fund prices, as well as U.S. sentiment indices such as the Standard and Poor's 500 and the Dow Jones Average. The level of significance varied in each case, without affecting the general pattern reported in the paper. The results, omitted here, are available from the authors upon request.

[20]The index was constructed as the sum of country fund prices in all three subsamples, plus funds from a group of European countries (Germany, Italy, Spain, and the United Kingdom), and was included as an alternative proxy of global sentiment, particularly in cases in which local stocks represented in *MSCI* are not fully accessible to foreign investors, as in many Asian countries.

Table 5. Causality During the Asian Crisis

X =	Hypothesis	Latam	Asia II
Price	$\beta_{2,i} = 0$	19.46***	...
	$\beta_{4,i} = 0$	...	7.97**
	$\beta_{5,i} = 0$	9.17**	5.17**
NAV	$\beta_{3,i} = 0$	...	4.74*
	$\beta_{4,i} = 0$	6.55**	5.34*
	$\beta_{5,i} = 0$	8.01**	...
STR	$\beta_{4,i} = 0$	9.82***	...
	$\beta_{5,i} = 0$	6.41**	...

Note: * means significant at the 1 percent level, ** at the 5 percent level, and *** at the 10 percent level.

$$X = \alpha + \Sigma_i^2 \beta_{1,i} P_{t-I} + \Sigma_i^2 \beta_{2,i} NAV_{t-I} + \Sigma_i^2 \beta_{3,i} STR_{t-I} + \Sigma_i^2 \beta_{4,i} MSCI_{t-I} + \Sigma_i^2 \beta_{5,i} CFIW_{t-I} + \beta_6 DIS_{t-1}$$

$$X = \alpha + \Sigma_i^2 \beta_{1,i} P_{t-I} + \Sigma_i^2 \beta_{2,i} NAV_{t-I} + \Sigma_i^2 \beta_{3,i} STR_{t-I} + \Sigma_i^2 \beta_{4,i} MSCI_{t-I} + \Sigma_i^2 \beta_{5,i} ER_{t-I} + \beta_6 DIS_{t-1}. \quad (3)$$

The results are summarized in Tables 5 and 6 (only statistically significant results are shown). Contrary to what appears to have been the case in Mexico in December 1994, in Asian II countries changes in fund prices seem to have led the behavior of the local stock market. Thus, causation runs from fund prices to NAVs, and from them to *STR*. In addition, there appears to be a significant contagion factor, channeled through the international markets and reflected in the impact from *MSCI* on fund prices. This evidence seems to support the view that Asian crises were induced to a large extent by the spillover from crises in neighboring countries, a chain reaction ignited by the devaluation of the Thai baht.[21]

In contrast, causality in most Latin American countries, and for the region as a whole, goes from world markets to local stock indices and NAVs, and from there to fund prices, suggesting that contagion may have been initiated by local investors as a response to developments in Asia. Finally, Asian I countries do not exhibit any significant pattern of causality.[22]

[21]As we discuss later in the paper, this does not imply that international investors actually fueled the crisis, only that they were the first to withdraw from these markets.

[22]While evidence from Thailand may suggest that foreign investors led the decline of stock prices, the link is not found in Korea and Indonesia. Fund prices in Korea and Indonesia, however, lagged developments in the world market, a sign of contagion that does not seem to have propagated to the local stock market. The absence of clear-cut results should not be surprising given the complexity of the crisis dynamics in these countries and the cross effects between them. The results, omitted here, are available from the authors upon request.

Table 6. Pairwise Granger Causality Test

	Argentina	Brazil	China	Mexico	Indonesia	Korea	Thailand	Malaysia	Philippines	Singapore
NAV does not Granger-cause price	*	***	***					**		
STR does not Granger-cause *NAV*	*		**	***		*				**
STR does not Granger-cause prices		**		**	*	*				
NAV does not Granger-cause *STR*	***	**	***	**	*[a]	*		**		*
NAV does not Granger-cause *MSCI*				***						
MSCI does not Granger-cause *STR*	**	**	**							
MSCI does not Granger-cause prices	*	*	**					***		***
MSCI does not Granger-cause *NAV*				*				**		*
Price does not Granger-cause *STR*				*		*	*		***	
Price does not Granger-cause *NAV*					*	*[a]		*	***	*

Note: * means significant at the 1 percent level, ** at the 5 percent level, and *** at the 10 percent level.
[a]Negative coefficient.

In short, in Asian countries, independent of the direction of propagation, crises were associated with the buildup of substantial premiums, but in Latin American countries, where the order of causality resembled the one found in the Mexican case, country fund discounts deepened as a result of the Asian crisis. Hence, we conclude that the closed-end country fund puzzle is not related to *when* fund prices react relative to local shares, but rather to *how*.

Are Discounts Stationary?

If funds are to be ultimately liquidated, discounts should be stationary in the long run. But several factors can affect discounts' behavior in the short run so as to make them nonstationary. For example, under the segmented markets hypothesis, changes in cross-border investment restrictions can break the stationarity of certain discounts. Furthermore, highly persistent changes in the perception of risk of the different agents who operate in both markets can also justify the rejection of stationarity over a limited sample.[23]

Because of the short time span of our sample, we rely on panel integration techniques to infer the long-run properties of discounts. Im, Pesaran, and Shin (1997) propose a *t*-statistics (*t*-IPS) to test for the null hypothesis of a unit root in a panel. Their tests are based on the average of the standard ADF *t*-statistic obtained from individual tests and does not require any homogeneity restriction. The finite common moments are obtained by Monte Carlo methods and are tabulated in Im, Pesaran, and Shin (1997). The general expression of the test, for a panel spanning *T* years and *N* cross-section units, is:

[23]This could have been the case, for example, after the Mexican crisis.

Table 7. Unit Root Tests

	Whole Sample	Tequila Crisis	Asian Crisis
Latin America	–0.35	–1.31	–1.45
Asia	–2.07	–7.27	–0.52
OECD	–5.11	–3.44	–4.05
Emerging Markets	–2.47	–1.54	–3.04

Note: Five percent critical value: –1.69.

$$t_{NT} = N^{1/2}\left(\overline{t_T} - E\left(t_T\right)\right) \Big/ \left(var\left(t_T\right)\right)^{1/2}, \tag{4}$$

where $\overline{t_T} = \sum_{i=n}^{N} t_{iT}$ and t_{iT} are statistics computed on each cross-section unit. The results for each region and subsample appear in Table 7. The evidence is mixed, although it reveals that regions that have gone through, or suffered contagion from, a major financial crisis show evidence of nonstationarity.[24]

This lack of stationarity of fund discounts is at odds with the standard interpretation of "investor sentiment." More important, it contradicts the view that crisis premiums are the result of *temporary* information asymmetries. Investors may display a significant degree of hysteresis, however, as changes in investor sentiment may be highly persistent or even subject to permanent revisions. For example, changes in the perception by foreign investors of the risk associated with Latin American stocks as a result of the Tequila crisis may still need a long time of stability to reverse themselves.[25]

Are Fund Returns Too Volatile?

Several researchers, including Pontiff (1996) and Hardouvelis, La Porta, and Wizman (1993), have found that the unconditional variance of the median fund return is significantly larger than the variance of returns on its NAV. For example, Pontiff (1996) computes the log-variance ratio of U.S. fund returns over returns on NAVs. This ratio should be zero if both variances are similar. Pontiff reports that the volatility of fund returns is 73 percent greater than the variance of the fund's underlying assets. Hardouvelis, La Porta, and Wizman conduct the same exercise for closed-end country funds and find the mean log-variance ratio to be 1.17, for a sample of 35 funds during the period 1986–93, which implies that country fund

[24] This confirms the results obtained in Levy-Yeyati and Ubide (1998) using univariate tests.

[25] It could be the case that the true risk involved in Latin American markets was fully understood by investors only after the Tequila episode. The same would apply to East Asian markets after the 1997 crisis.

returns are about three times as volatile as NAV returns. This result supports the noise-trader hypothesis: country funds command a discount due to the excess volatility that results from the behavior of small investors. From this argument, it follows that crisis premiums may be explained by an increase on the relative volatility of the underlying asset returns.

We repeated this exercise for our sample, and found a mean value of the log-variance ratio of 0.2, significantly lower than in Hardouvelis, La Porta, and Wizman (1993). Moreover, the distribution across regions is not uniform: the ratio for Asia is 0.07, not significantly different from zero, whereas Latin America has a ratio of 0.14, and the OECD has a ratio of 0.31. Within the regions, countries such as Indonesia, Korea, Malaysia, Mexico, Thailand, and Turkey have ratios that are zero or even negative.

Data on the entire sample may mask interesting dynamics that illuminate the behavior of funds during crisis periods. Estimates of excess volatility for the Tequila crisis and Asian crisis subsamples reveal the different regional behavior: the log-variance ratio is lower for crisis countries (Latin America in the first period; Asia in the second) and higher in contagion countries (Asia in the first period; Latin America in the second). In other words, local market volatility seems to increase relative to fund market volatility in the wake of financial crises. The last column of Table 8 shows the correlation between the log-variance ratio and the discount for the whole sample period (see also Figure 5). As expected, the correlation is negative, as riskier assets are penalized in the form of larger discounts.[26]

Next, we compute the correlation of the changes in discounts with changes in NAVs and fund prices.[27] If discount variability is driven primarily by changes in NAVs, we should observe a large negative correlation between them. Conversely, if changes in discounts are largely explained by variations in fund prices, the correlation coefficient between them will be positive and higher than that between discounts and NAVs. The results in Table 9 show that, in general, prices are more closely correlated with discounts than NAVs, supporting the noise-trader hypothesis. The correlation with NAVs, however, increases sharply in absolute value for crisis countries, dominating the correlation between discounts and prices.

Therefore, this evidence suggests that the emergence of large premiums during a crisis is associated with a temporary decline in the excess volatility of fund prices, as well as an increase in the importance of changes in NAVs as an explanatory factor of variations in discounts.

Is There a Common Component Across Country Fund Discounts?

The noise-trader hypothesis suggests a common systematic source of risk as the main reason behind the behavior of discounts across funds. As was mentioned in the previous section, this implies that discounts originate in the behavior of a particular type of investor and that it affects all assets in his portfolio similarly,

[26]Since discounts are measured in the paper as the price to NAV ratio, higher excess volatility is associated with a larger discount, resulting in a negative volatility-discount correlation.

[27]For comparable values of price and NAV volatility, we would expect the first to be positive and the second to be negative.

Table 8. Log-Variance Ratio

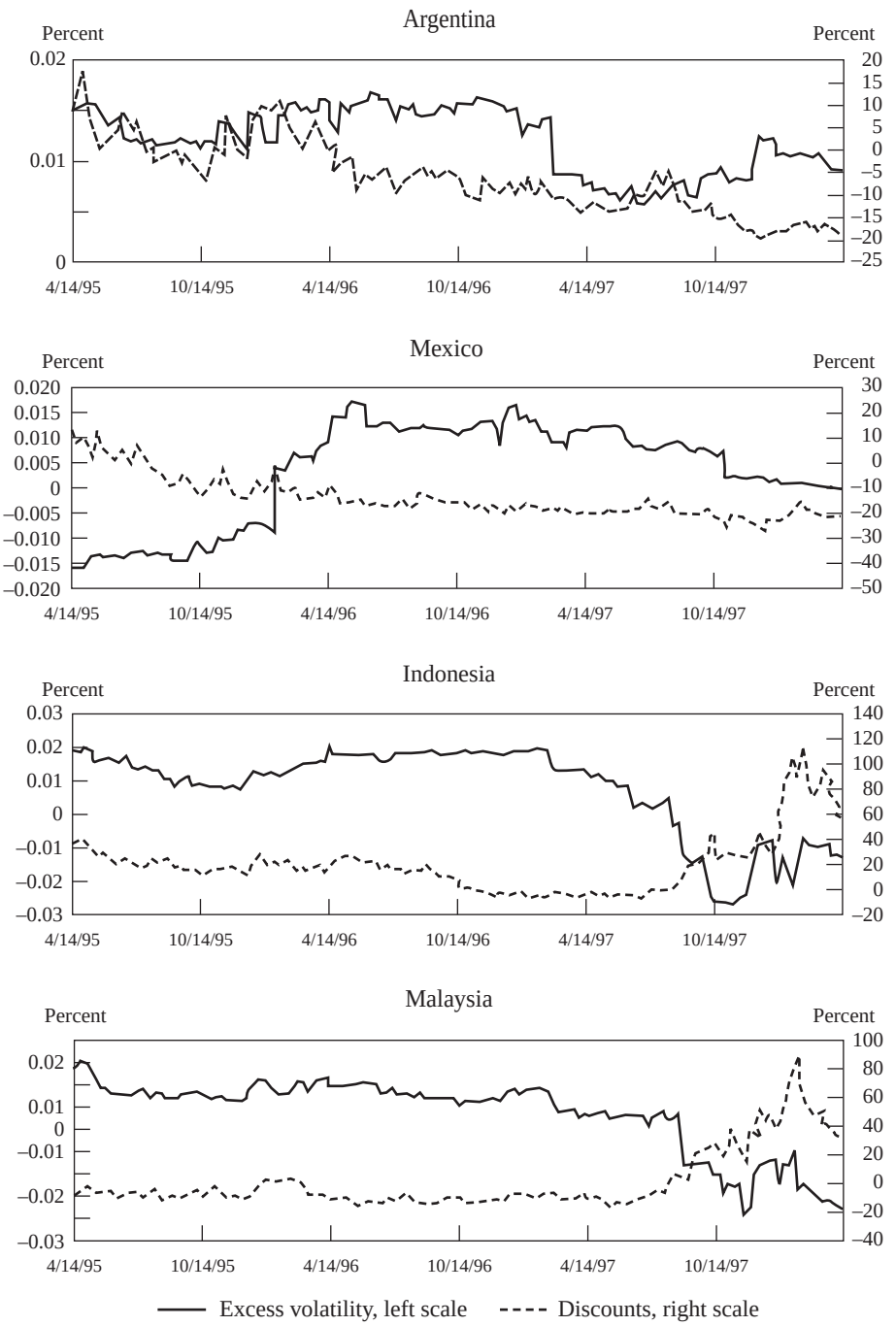
	Whole	Tequila Crisis	Asian Crisis	Correlation (LV, Discount)
AZ	0.27	0.12	0.21	–0.30
BZF	0.09	0.03	0.12	–0.18
CH	0.28	0.26	0.22	–0.22
MXE	0.08	0.02	0.07	–0.22
MXF	–0.02	–0.12	0.06	–0.30
Latin America	0.14	0.06	0.14	–0.25
FPF	0.01	0.32	–0.18	–0.23
IF	0.00	0.34	–0.10	–0.63
KF	0.09	0.40	0.04	–0.09
MF	–0.06	0.27	–0.19	–0.18
SGF	0.21	0.31	0.06	–0.02
TTF	0.00	0.19	–0.07	–0.70
TWN	0.26	0.33	0.20	0.22
Asia	0.07	0.31	–0.03	–0.31
FAX	0.17	0.20	0.06	0.12
GF	0.35	0.38	0.30	–0.42
GSP	0.14	0.16	0.14	0.65
IRL	0.51	0.47	0.52	0.17
ITA	0.17	0.23	0.12	–0.07
JOF	0.44	0.40	0.44	0.21
PGF	0.36	0.63	0.19	–0.72
UKM	0.34	0.47	0.29	0.01
OECD	0.29	0.40	0.23	–0.01
SOA	0.13	0.13	0.06	–0.19
TKF	–0.15	–0.19	–0.16	–0.56
ISL	0.31	0.46	0.17	–0.66
Emerging Markets	0.10	0.14	0.03	–0.47
Average	0.15	0.23	0.09	–0.26

suggesting the existence of an important common component in discounts across countries.

The most immediate way of analyzing commonalities is to compute correlations across fund discounts. Levy-Yeyati and Ubide (1998) report the correlation matrix of discounts in first differences. Their results show positive intra-region correlations and zero or negative inter-region correlations. This seems to indicate the presence of common *regional* components in the behavior of discounts, rather than a global common factor as found in previous studies.

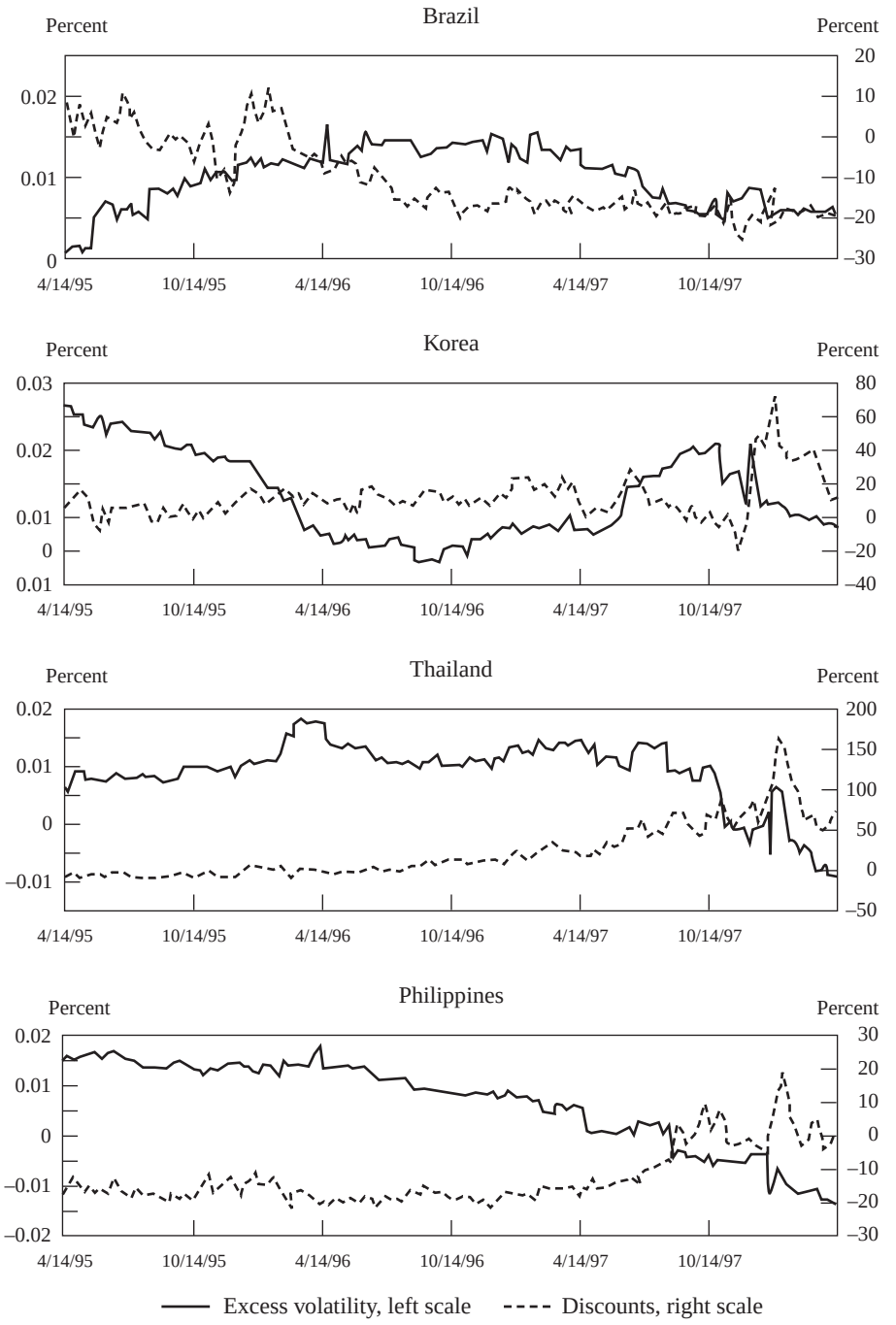
We explore this issue further by estimating a parametric version of the "single index" model of Sargent and Sims (1977) as developed by Stock and Watson (1988). The estimation of an unobserved components model is a more sophisticated technology than simple correlations to capture the presence of common components across economic time series. The empirical model is as follows:

Figure 5. Excess Volatility and Discounts



Source: Bloomberg.

Figure 5. *(concluded)*



Source: Bloomberg.

Table 9. Correlations of Changes in Discounts with Changes in Prices and NAVs

	Whole Sample		Tequila Crisis		Asia Crisis	
	(*DIS*,*P*)	(*DIS*,*NAV*)	(*DIS*,*P*)	(*DIS*,*NAV*)	(*DIS*,*P*)	(*DIS*,*NAV*)
AZ	0.65	0.03	0.66	–0.06	0.50	0.08
BZF	0.50	–0.29	0.43	–0.36	0.51	–0.20
CH	0.70	–0.02	0.67	–0.10	0.61	–0.01
MXE	0.35	–0.23	0.39	–0.34	0.39	–0.03
MXF	0.26	–0.43	0.27	–0.57	0.40	–0.14
Latin America	0.49	–0.19	0.49	–0.29	0.48	–0.06
FPF	0.47	–0.35	0.73	–0.17	0.16	–0.61
IF	0.42	–0.33	0.78	–0.36	0.28	–0.41
KF	0.57	–0.30	0.79	–0.27	0.39	–0.29
MF	0.32	–0.33	0.67	–0.17	0.14	–0.58
SGF	0.65	–0.32	0.70	–0.34	0.53	–0.45
TTF	0.32	–0.21	0.61	–0.20	0.41	–0.53
TWN	0.66	–0.22	0.72	–0.32	0.57	0.01
Asia	0.49	–0.29	0.71	–0.26	0.36	0.41
FAX	0.72	–0.57	0.76	–0.59	0.55	–0.52
GF	0.67	–0.20	0.77	–0.18	0.56	–0.24
GSP	0.54	0.28	0.59	–0.19	0.64	0.44
IRL	0.81	–0.25	0.80	–0.16	0.86	–0.33
ITA	0.60	–0.26	0.71	–0.38	0.51	–0.16
JOF	0.81	–0.31	0.82	–0.40	0.81	–0.21
PGF	0.71	–0.16	0.89	–0.23	0.61	–0.15
UKM	0.69	–0.24	0.75	–0.29	0.69	–0.10
OECD	0.68	–0.22	0.77	–0.27	0.64	–0.17
SOA	0.48	–0.20	0.40	–0.34	0.41	–0.19
TKF	0.31	–0.49	0.40	–0.67	0.12	–0.56
ISL	0.69	–0.20	0.76	–0.08	0.59	–0.34
Emerging Markets	0.50	–0.30	0.52	–0.36	0.37	–0.36

$$Y_t = \alpha Z_t + U_t, \quad (5)$$

where

$$Z_t = \rho_z Z_{t-1} + \varepsilon_t,$$

$$U_t = \rho_u U_{t-1} + \mu_t.$$

Each discount is assumed to move contemporaneously with an unobserved scalar time series variable, Z_t, common to all funds, and a component $U_{i\,t}$ that comprises idiosyncratic elements plus measurement errors; both components are assumed to be stochastic. The unobserved component Z_t enters the model only contemporaneously, whereas the idiosyncratic component follows a first-order autoregressive process. Y_t is the vector containing all the discounts and ε_t and μ_t are white noise errors. The main identifying assumption expresses the core notion that all the commonalities in the discounts arise from a single source, Z_t. This is achieved by assuming that Z_t and U_t are mutually uncorrelated at all leads and lags.

The estimation is performed by first casting the model into a state space form and then extracting the unobserved component with the Kalman filter by maximum likelihood. Given the suspected lack of stationarity but also lack of cointegration among the variables, the model is estimated in differences. We first tried to extract the common component of the 24 funds over the whole period, but it was impossible to obtain convergence in the optimization process. The failure to find a common component casts doubt on the existence of a common investor sentiment driving the behavior of all country fund discounts. To test for regional sentiment, we estimated the common component model for Europe (or EU, which comprises Germany, Ireland, Italy, Portugal, Spain, and the United Kingdom), Latin America and the Caribbean (or LAC, which includes Argentina, Brazil, and Mexico), Asia II (Malaysia, Philippines, and Singapore) and other Emerging Markets (or EM, which comprises Israel, South Africa, and Turkey).[28] Given the suspected change in investor confidence toward emerging markets after the Tequila crisis, we estimate the model for the whole sample and for the two subsamples, the Tequila and Asian crises. In all the cases, the estimation was performed in first differences, and then the series in levels was reconstructed by taking as a starting point the average value of the series included in the group. Several points stood out. First, all groups had significant common components, although for Asia II and EM the common component was significant only for the Asian crisis period. This common component explains on average about 20 percent of the variance of the discounts, and ranges from 35 percent for LAC during the Asian crisis to 10 percent for Asia II, also during the Asian crisis. Second, the common components displayed a high degree of persistence: first order autocorrelations ranged from 0.89 to 0.97, showing a persistence considerably greater than that estimated for the idiosyncratic (country-specific) components. Third, and more important, as Figure 6 shows, an important declining trend in the LAC component contrasts with the upward trend in the Asian component during the period corresponding to the Asian crisis. Note also that the common component captures the important peak of the Asian crisis, as well as the effect of major events and announcements.

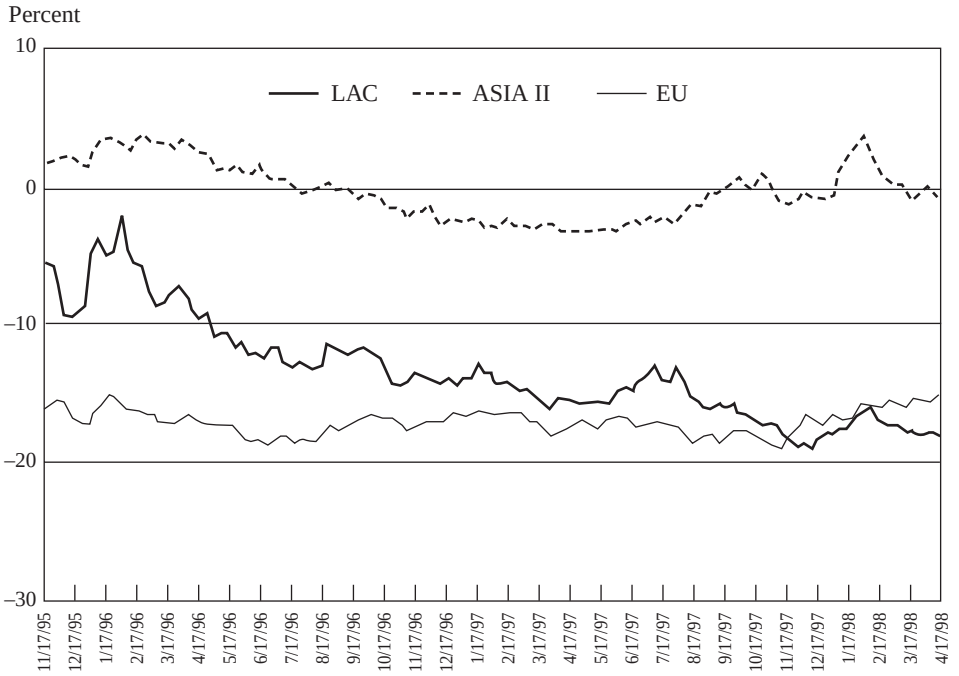
Even in the presence of a common market sentiment driving the evolution of fund prices, the test of common component on discounts would fail if fund prices moved differently vis-à-vis local markets for countries in different groups.[29] To determine whether market sentiment is region-specific or whether the common component of discounts captures similarities in the local response, we repeat the estimation of the model substituting fund prices for discounts, for the Asian crisis period. As Figure 7 shows, the Asian crisis manifests itself with different intensity across groups, being as expected strongest in Asia I and weakest in Latin America. However, this time the common component displayed a similar pattern across regions, showing a flat trend during the precrisis period, and a decline from July 1997 on.[30] This similarity, and the fact that the three components are

[28]We failed to find a common component in discounts for Asia I countries.

[29]It is easy to see that, if the common price component moves in the same direction irrespective of whether host market values increase or fall, discounts will widen in the first case and decline in the second.

[30]It is interesting to note that this market sentiment index starts to reflect the imminence of the Asian crisis almost one year after the Thai Fund discount turned into a premium, as a result of the first indications of financial distress in July 1996 (Figure 4).

Figure 6. Discounts: Common Component



Source: Bloomberg.

Notes: LAC comprises Argentina, Brazil, and Mexico; Asia II comprises Malaysia, the Philippines, and Singapore; and EU comprises Germany, Ireland, Italy, Portugal, Spain, and the United Kingdom.

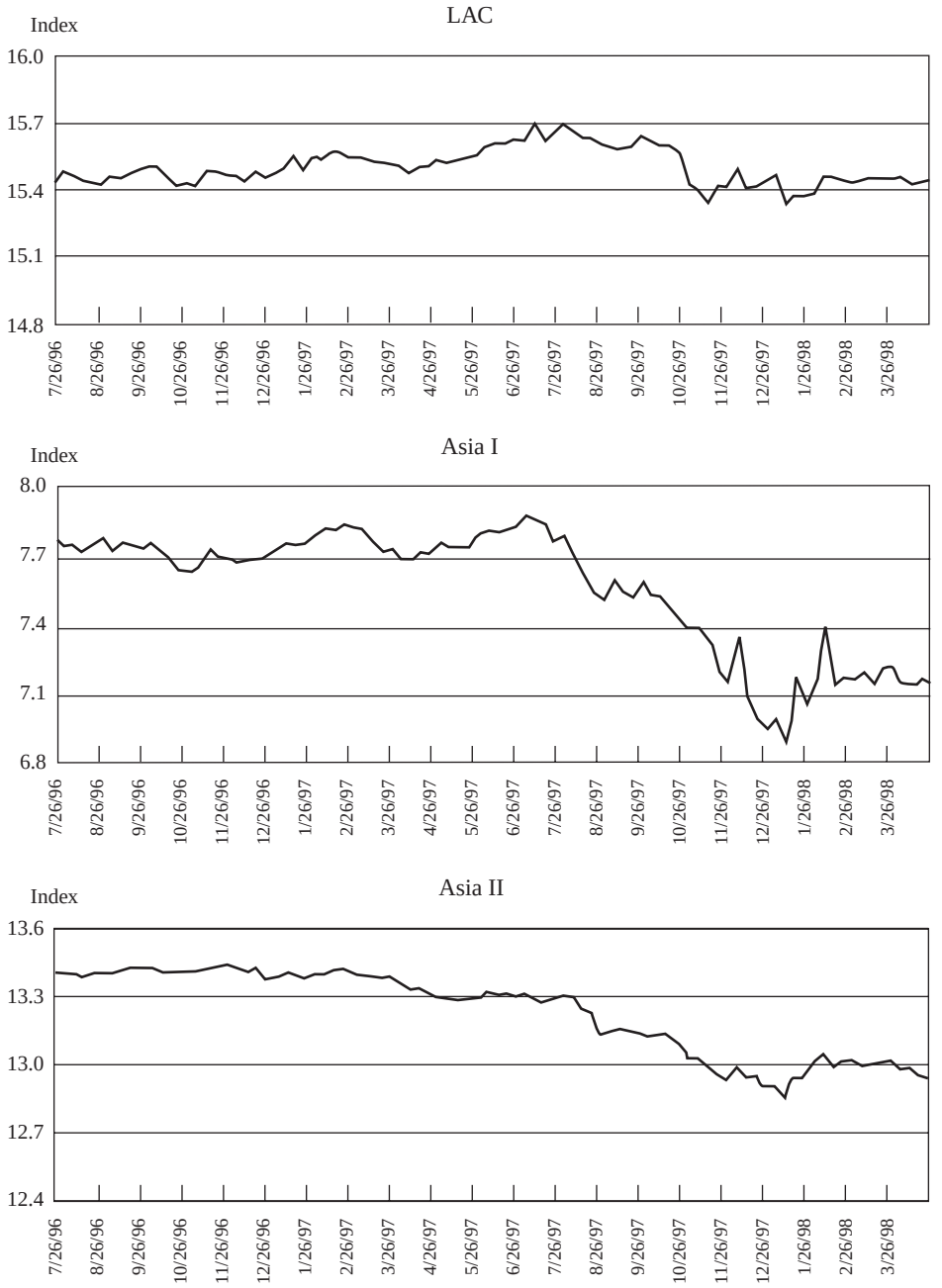
highly correlated with each other, is confirmed by the existence of a weaker, but still significant, common component across groups.

These results have three important implications. First, there is indeed evidence that the behavior of country fund prices is driven, in part, by investor sentiment. Second, this sentiment discriminates to some extent between emerging markets in different regions. Third, a comparison of common components in prices and in discounts strongly suggests that the different patterns displayed by discounts in crisis and non-crisis countries can only be explained by differences in the *relative* behavior of fund and stock prices or, alternatively, of foreign and local investors. This hypothesis is explored in the following section.

III. The "Stickiness" of Country Fund Prices

One aspect of the behavior of country funds reported in the existing literature is that fund prices tend to underreact to local factors and to overreact to external (global) factors. Although no convincing theoretical explanation has been proposed, this empirical regularity by itself could help explain why funds build up premiums during stock market crashes in crisis countries. Indeed, one could think of a simple reduced-form characterization of the behavior of fund prices and NAVs in the following way:

Figure 7. Prices: Common Component



Source: Bloomberg.

Notes: LAC comprises Argentina, Brazil, and Mexico; Asia I comprises Indonesia, Korea, and Thailand; and Asia II comprises Malaysia, the Philippines, and Singapore.

Figure 8. Prices: Common Component
Whole Sample

Source: Bloomberg.

$$P = p(L, X), \tag{6}$$

$$NAV = n(L, X), \tag{7}$$

where L and X are local and external factors, and,

$$p'_1 < n'_1, \tag{8}$$

$$p'_2 > n'_2. \tag{9}$$

Thus, a collapse in the local stock market, through its effect on L, would affect NAVs more strongly than fund prices. If changes in external conditions are comparatively minor, the price to NAV ratio would increase. Alternatively, if country specific fundamentals are in good shape, a foreign crisis would influence prices relatively more, deepening the fund discount.[31]

From equations (6) and (7), it follows that changes in world market conditions would primarily affect fund prices, whereas changes in local markets would be reflected relatively more in NAVs. More precisely, a crisis abroad that propagates through the international markets inducing a decline in the world

[31]According to this hypothesis, crisis countries with more open capital markets are likely to benefit from the stabilizing influence of foreign investors. This may explain why the crisis premiums in the fairly open Latin American markets were significantly below the levels reached in the closed Asian economies.

Table 10. Discounts as a Function of Local and External Factors

Sample	Period	*STR*	*MSCI*	DIS_{-1}
Whole	Whole	–0.002***	0.081***	–0.111***
		(–3.04)	(4.04)	(–13.56)
Whole	Tequila Crisis	–0.002	0.119***	–0.212***
		(–1.54)	(3.08)	(–14.91)
Whole	Asian Crisis	–0.001*	0.080***	–0.147***
		(–1.72)	(5.02)	(–10.13)
Emerging Markets	Whole	–0.002***	0.139***	–0.092***
		(–3.15)	(4.17)	(–10.20)
Emerging Markets	Tequila Crisis	–0.002	0.326***	–0.197***
		(–1.59)	(5.03)	(–12.00)
Emerging Markets	Asian Crisis	–0.001**	0.080***	–0.133***
		(–2.16)	(3.23)	(–8.00)

Note: *t*-statistics in parentheses. * means significant at the 1 percent level, ** at the 5 percent level, and *** at the 10 percent level.

$$DIS_t = \alpha + \beta_1 STR_t + \beta_2 MSCI_t + \beta_3 DIS_{t-1}$$

market index would lead to an increase in discounts in noncrisis country funds, as fund prices fall more than local stocks. Conversely, a local crisis would depress local share prices relatively more. Therefore, we should be able to observe a positive correlation between the world market index and country fund discounts and a negative correlation between discounts and the local stock index.[32] A regression of changes in fund discounts on changes in *STR* and *MSCI*, and lagged discounts, confirms this prediction. Table 10 presents the coefficients and associated *t*-values. Variations in the world market index always maintain a significant negative correlation with fund discounts, as fund prices react stronger to external factors than local stocks. However, the coefficient corresponding to the local market is always negative and significant, except for the period of the Mexican crisis.

Further support for the stickiness hypothesis is provided by examining the behavior of country fund prices and NAVs vis-à-vis local and external factors. To do so, we first regress country fund premiums on changes in NAVs and a measure of foreign investor sentiment (*MSCI*). As mentioned earlier, a broad definition of market sentiment can allow for some degree of discrimination across countries, as suggested by the evidence on common components discussed before. More precisely, in the context of the Asian crisis, foreign investors may have become relatively more pessimistic with respect to neighboring Asian countries than to emerging markets as a whole.[33]

[32]Using *STR* and *MSCI* as proxies for local and external factors in equations (6) and (7), one can readily see that

$$dDIS/dSTR = p'_1 - n'_1 < 0,$$

$$dDIS/dMSCI = p'_2 - n'_2 > 0.$$

Hence, we conducted the same test including both *MSCI* and the *NAV* of the Korea Fund.[34] We estimated the equation using seemingly unrelated regression estimation (SURE) with different constant terms and similar coefficients across countries, for the Asian I, Asian II, and Latin American subsamples, and for a European subsample (Germany, Italy, Spain, and the United Kingdom) that we use as control group.[35]

As Tables 11 and 12 show, the results for the whole sample confirm previous evidence presented in the literature indicating that fund prices respond significantly to changes in world market conditions, after controlling for changes in the local market, as reflected by the large and highly significant coefficient on *MSCI*. Some interesting differences are uncovered by dividing the sample. First, the fraction of fund prices accounted for by variations in NAVs is substantially larger in the European group than in emerging markets (Table 11). Conversely, the influence of the world market index is substantially stronger in these countries, revealing the impact of foreign factors, and in particular, the extent of the contagion from crisis countries (Table 12). This effect is not evenly distributed across countries. While European funds are the least affected by foreign factors, in Latin America funds were influenced both by developments in world markets in general, and in Asian markets in particular. Finally, the impact of Asian regional factors on Asian markets was, as expected, more important.[36]

To examine this in more detail, we regress changes in both prices and NAVs on local market conditions, proxied by local currency stock market returns, *STR*; changes in the exchange rate, *ER*; returns on a world market indicator, *MSCI*; and the lagged discount.[37] The results, presented in Table 13, confirm that country fund prices can be explained more by world market conditions and less by local factors than their NAVs, as indicated by lower *STR* coefficients and higher *MSCI* coefficients in the price equations.[38] As expected, a lower sensitivity to external factors is usually accompanied by a higher one to local factors.

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[33]Note that, although it was reasonable to expect Asian II countries to suffer spillovers on fundamentals (e.g., a deterioration of the current account), these fundamental changes should have had the same effect on fund prices and NAV, with no impact on discounts. Our conjecture here, however, is that imperfectly informed foreign investors would tend to correlate nonfundamental changes in Asia I countries with changes in regional emerging markets more than with changes in other emerging markets.

[34]Several tests were conducted using proxies for market conditions in all three Asian crisis countries. Due to the high correlation between these proxies during the period under analysis, only the Korean NAV was found to be consistently significant. This result does not imply that Korea was the only regional factor behind the behavior of country fund prices. We prefer to interpret the Korean index as an imperfect measure of the overall macroeconomic conditions in Asian crisis countries.

[35]These European funds were not subject to either episodes of financial distress at home, or contagion from crisis abroad. In addition, they are considered to have open capital markets. Thus, they can be taken as representative of the "steady state" behavior in the absence of barriers.

[36]This finding is consistent with the view that foreign investor sentiment discriminates between mature and emerging markets and, in turn, between crisis and noncrisis regions.

[37]Several other specifications were tested, including the Dow Jones Average and the Standard and Poor's 500 indices of the New York Stock Exchange, the Morgan Stanley Emerging Market Index, and stock market indices of the crisis countries. The model presented here, selected using a "general to specific" approach, follows the criterion that a particular regressor be significant at least for one country sample. The devaluation rate was included separately due to the fact, reported in Hardouvelis, La Porta, and Wizman (1993) and confirmed in this paper, that country prices are highly inelastic to exchange rate changes.

[38]The fact that in crisis countries NAVs are strongly linked to the world index probably reflects the inverse causality, that is, the effect of the evolution of local market returns on the *MSCI*.

Table 11. The Stickiness of Country Fund Prices

Sample	Period	*NAV*	NAV_{-1}	NAV_{-2}	*DIS*
Whole	Asian Crisis	0.804***	...	...	...
		(41.24)			
Whole	Asian Crisis	0.808***	0.056***	0.016	...
		(41.40)	(2.89)	(0.81)	
Whole	Asian Crisis	0.828***	0.053***	0.021	–0.0007***
		(42.89)	(2.75)	(1.09)	(–6.66)
Emerging Markets	Asian Crisis	0.649***	0.020	–0.012	–0.0005***
		(27.07)	(0.85)	(–0.45)	(–4.45)
Europe	Asian Crisis	1.049***	0.041	0.045	–0.0019***
		(38.14)	(1.49)	(1.64)	(–5.37)

Note: *t*-statistics in parentheses. * means significant at the 1 percent level; ** at the 5 percent level, and *** at the 10 percent level.

$$P = \alpha + \Sigma_i^2 \beta_{1,i} NAV_{t-I} + \beta_2 DIS_{t-1}$$

Table 12. Determinants of Country Fund Prices

Sample	Period	*DIS*	*NAV*	*MSCI*	*KORNAV*
Whole	Asian Crisis	–0.0007***	0.782***	0.351***	...
		(–6.73)	(39.14)	(7.28)	
Latin America	Asian Crisis	–0.0017***	0.852***	0.34***	...
		(–4.67)	(20.19)	(3.84)	
Latin America	Asian Crisis	–0.0016***	0.857***	0.286***	0.038**
		(–4.68)	(20.43)	(3.12)	(2.05)
Asia II	Asian Crisis	–0.0003**	0.515***	0.486***	...
		(–1.97)	(11.39)	(3.34)	
Asia II	Asian Crisis	–0.0003*	0.493***	0.389***	0.107***
		(–1.88)	(11.44)	(2.73)	(3.53)
Asia I	Asian Crisis	–.0004***	0.544***	1.128***	...
		(–2.67)	(11.75)	(4.51)	
Europe	Asian Crisis	–0.0021***	1.020***	0.283***	...
		(–5.89)	(35.10)	(4.50)	

Note: *t*-statistics in parentheses. * means significant at the 1 percent level, ** at the 5 percent level, and *** at the 10 percent level.

$$DIS_t = \alpha + \beta_1 DIS_{t-1} + \beta_2 NAV_t + \beta_3 MSCI_t + \beta_3 KORNAV_t$$

IV. Discussion and Conclusions

In this paper, we documented a striking empirical regularity displayed by closed-end country funds: their price to NAV ratio increases sharply during financial crisis. Moreover, the opposite is true for countries most directly affected by contagion. In them, the relation between fund prices and underlying

Table 13. Differential Effect of Local and External Factors

	Sample	Period	*DIS*	*STR*	*ER*	*MSCI*
Price	Latin America	Asian Crisis	...	0.637***	...	0.436***
				(15.60)		(4.19)
	Asia I	Asian Crisis	...	0.525***	...	1.290***
				(7.67)		(4.58)
	Asia II	Asian Crisis	–0.0004*	0.428***	0.292***	0.546***
			(–1.97)	(7.29)	(2.84)	(3.38)
NAV	Latin America	Asian Crisis	0.0005*	0.572***	–0.286*	0.198***
			(1.77)	(18.79)	(–1.78)	(2.60)
	Asia I	Asian Crisis	...	0.802***	...	0.949***
				(12.87)		(3.43)
	Asia II	Asian Crisis	...	0.893***	...	...
				(22.96)		

Note: *t*-statistics in parentheses. * means significant at the 1 percent level, ** at the 5 percent level, and *** at the 10 percent level.

$X_t = \alpha + \beta_1 NAV_t + \beta_2 MSCI_t + \beta_3 DIS_{t-1} + \beta_4 Er_{t-1}$

assets deteriorates. We showed that this regularity does not depend on whether the crisis is originated by foreign or local investors.[39]

We presented evidence that a common (market sentiment) component can be identified for both Asian and Latin American markets during the Asian crisis period, and that stronger commonalities are found when we restrict our attention to specific regions, suggesting a certain degree of discrimination among foreign investors. But we found that discounts do not reflect the behavior of foreign investors per se, but in relation with local investors. More precisely, we showed that the evolution of fund discounts over time is due to the fact that foreign investors respond less than local investors to changes in local market conditions. Moreover, the evidence suggests that while foreign investor reaction to the 1997 crises was relatively homogeneous in Asian and Latin American countries, differences in the *local* response underlay both the dynamic behavior of fund discounts and its cross-country variation.[40]

This asymmetric response may be the result of local investors' access to privileged, not readily observable, information on local markets. In turn, asymmetric information may induce foreign investors to partially mimic the behavior of local investors and use information from one emerging market as a proxy for others. If this is the case, however, the price to NAV ratio should revert to the initial level

[39]It is interesting to note that the same regularity was again observed during the recent Russian and Brazilian crises: the price to NAV ratio of the Brazil Fund (BZF) significantly declined during the Russian crisis (from –20 percent in July 1998 to –39 percent in mid-September 1998), whereas it increased sharply during the Brazilian crisis (it increased from –29 percent in mid-January 1999 to –11 percent in mid-March 1999).

[40]For example, NAVs substantially increased their volatility relative to fund prices in Asian countries during the crisis episode, while the opposite was true for Latin America in the same period. In addition, discounts become increasingly more correlated with NAVs than with fund prices in crisis countries, indicating that their evolution may have been largely driven by local trading.

within a relatively short period of time, as previously private information is revealed. Contradicting this intuition, we showed that discounts exhibit high persistence, and in many cases nonstationarity cannot be rejected.[41]

Instead, we believe that the evidence tends to favor a market segmentation argument: the liquidity crunch that usually follows a financial crisis is likely to burden local investors more heavily, inducing a fire sale of local assets at below their fundamental value.[42] Thus, crisis premiums could be interpreted as a measure of local *overreaction*, in contrast with the foreign underreaction suggested by the asymmetric information story. Interestingly, in this case, the size of the premium would reflect in part the relative share of the cost of the crisis paid by local investors. This effect is compounded by the fact that local investors' portfolios tend to be more concentrated in domestic assets, so that a change in local expected returns exerts a sharper response from less diversified local investors.[43]

It follows that restrictions on foreign participation in local markets, by preventing arbitrage by global investors, may worsen the effects of a financial crisis on domestic asset prices. As the evidence presented here suggests, however, the presence of internationally diversified foreign investors does not come without costs, as such investors are more sensitive to global market conditions, and thus more likely to propagate the effect of a crisis to otherwise sound economies.

REFERENCES

Benarzti, Shlomo, and Richard Thaler, 1995, "Myopic Loss Aversion and the Equity Premium Puzzle," *Quarterly Journal of Economics*, Vol. 110 (February), pp. 73–92.

Bodurtha, James, Dong-Soon Kim, and Charles Lee, 1995, "Close-End Country Funds and U.S. Market Sentiment," *The Review of Financial Studies*, Vol 8 (Fall), pp. 879–918.

Chen, Nai-Fu, Raymond Kan, and Merton Miller, 1993, "Are the Discounts on Close-End Funds a Sentiment Index?" *The Journal of Finance*, Vol. 48 (March), pp. 795–800.

Chopra, Navin, Charles Lee, Andrei Shleifer, and Richard Thaler, 1993, "Yes, Discounts on Closed-End Funds Are a Sentiment Index," *The Journal of Finance*, Vol. 48 (March), pp. 801–04.

De Long, Bradford, Andrei Shleifer, Lawrence Summers, and Robert Waldmann, 1990, "Noise Trader Risk in Financial Markets," *Journal of Political Economy*, Vol. 98 (August), pp. 703–38.

Diwan, Ishac, Vihang Errunza, and Lemma Senbet, 1993a, "Empirical Perspectives on National Index Funds," International Economics Department Working Paper No. 1206 (Washington: World Bank).

[41]Indeed, it looks like sentiment in relation to Latin American markets was subject to a permanent downward revision, as indicated by the appearance, in the aftermath of the Tequila crisis, of discounts that were larger than their precrisis averages.

[42]Several reasons could trigger this liquidity crunch. First, a generalized collapse in asset prices decreases the value of collateral available in the economy and leads to a decrease in bank lending, a process similar to the one described in Kiyotaki and Moore (1997). Second, a fall in asset prices decreases the capitalization of domestic banks, which may be forced to limit credit to comply with capital adequacy regulations. Finally, a financial crisis is likely to exacerbate adverse selection problems, possibly inducing credit rationing.

[43]For a discussion of the home bias literature, see Tesar and Werner (1995), and references therein.

———, 1993b, "The Pricing of Country Funds and Their Role in Capital Mobilization for Emerging Economies," International Economics Department Working Paper No. 1058 (Washington: World Bank).

Frankel, Jeffrey, and Sergio Schmukler, 1996, "Country Fund Discounts, Asymmetric Information and the Mexican Crisis of 1994: Did Locals Turn Pessimistic Before International Investors?" CIDER Working Paper No. C96-067 (Berkeley, California: Center for International and Development Economics Research).

Hardouvelis, Gikas, Rafael La Porta, and Thierry Wizman, 1993, "What Moves the Discount on Country Equity Funds?" NBER Working Paper 4571 (Cambridge, Massachusetts: National Bureau of Economic Research).

Herzfeld, Thomas, 1980, *The Investor's Guide to Closed-End Funds* (New York: McGraw Hill).

Im, K., Hashem Pesaran, and Yin Shin, 1997, "Testing for Unit Roots in Heterogeneous Panels" (unpublished; University of Cambridge).

Kiyotaki, Nobuhiro, and John Moore, 1997, "Credit Cycles," *Journal of Political Economy*, Vol. 105 (April), pp. 211–48.

Kramer, Charles, and Richard Todd Smith, 1995, "Recent Turmoil in Emerging Markets and the Behavior of Country Fund Discounts: Renewing the Puzzle of the Pricing of Closed End Mutual Funds," IMF Working Paper 95/86 (Washington: International Monetary Fund).

Lee, Charles, Andrei Shleifer, and Richard Thaler, 1991, "Investor Sentiment and the Closed-End Fund Puzzle," *The Journal of Finance*, Vol. 46 (March), pp. 75–109.

Levy-Yeyati, Eduardo, and Angel Ubide, 1998, "Crises, Contagion and the Closed-End Country Fund Puzzle," IMF Working Paper 98/143 (Washington: International Monetary Fund).

Pontiff, Jeffrey, 1996, "Costly Arbitrage: Evidence from Closed-End Funds," *Quarterly Journal of Economics*, Vol. 111 (November), pp. 1135–51.

Sargent, T., and C. Sims, 1977, "Business Cycles Modeling Without Pretending to Have Too Much A-Priori Economic Theory," in *New Methods in Business Cycle Research*, ed. by C. Sims and others (Minneapolis: Federal Reserve Bank of Minneapolis).

Stock, J., and M. Watson, 1988, "A Probability Model of the Coincident Economic Indicators," NBER Working Paper No. 2772 (Cambridge, Massachusetts: National Bureau of Economic Research).

Stulz, Rene, 1981, "On the Effects of Barriers to International Investment," *Journal of Finance*, Vol. 36 (March), pp. 923–34.

Tesar, Linda, and Ligrid Werner, 1995, "Home Bias and High Turnover," *Journal of International Money and Finance*, Vol. 14 (August), pp. 467–92.