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# Managers, investors, and crises: mutual fund strategies in emerging markets

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**Abstract**

We examine the trading strategies of mutual funds in emerging markets. We develop a method for disentangling the behavior of fund managers from that of underlying investors. For both managers and investors, we strongly reject the null hypothesis of no momentum trading: mutual funds systematically sell losers and buy winners. Selling current losers and buying current winners is stronger during crises, and equally strong for managers and investors. Selling past losers and buying past winners is stronger for managers. Managers and investors also practice contagion trading—they sell (buy) assets from one country when asset prices fall (rise) in another.



*JEL classification:* F3; G1; G2

*Keywords:* ; Mutual funds; Managers; Investors; Trading strategies; Emerging markets; Momentum; Feedback trading; Crisis; Contagion

## 1. Introduction

This paper examines the trading strategies of equity mutual funds in emerging markets. Though the existing literature on mutual funds' domestic (US) strategies

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is large (Grinblatt et al., 1995; Warther, 1995; and Wermers, 1999, among others), ours is the first systematic analysis of mutual funds' international strategies. Beyond providing a first look at fund-level international strategies, we address whether mutual funds' strategies differ across crisis and non-crisis periods. For example, during crisis are mutual funds more inclined to sell stocks whose prices have fallen? Evidence on this important question is indirect or highly aggregative. For example, Marcis et al. (1995) and Rea (1996) examine aggregate flows into and out of emerging market mutual funds but cannot address the changing composition of individual fund holdings. Though Frankel and Schmukler (2000) clarify how crises affect mutual fund pricing, they do not address which underlying stocks are sold. Other work on international trading strategies during crises either groups mutual funds with other institutional investors (Choe et al., 1999; Froot et al., 2001; Kim and Wei, 2002) or addresses a different class of institutional investor (Brown et al., 2000; Eichengreen and Mathieson, 1998).[1] Mutual funds are both important enough in emerging markets (Kaminsky et al., 2001) and distinct enough in their objectives and constraints to warrant focused attention.[2]

Our paper departs from previous research by analyzing the international trading of mutual funds at the portfolio level. We construct a novel data set of individual portfolios, allowing us to examine trading strategies at much higher resolution. The data include the quarterly holdings of 13 mutual funds from April 1993 to January 1999. All 13 funds are dedicated Latin America funds. (At year-end 1998, there were 25 Latin America funds; the 13 we track account for 88% of the value of these 25 funds.) We use these data to address two sets of questions.[3] The first set relates to whether funds engage in momentum trading—systematically buying winning stocks and selling losing stocks (Jegadeesh and Titman, 1993; Grinblatt et al., 1995). The second set of questions relates to whether funds engage in contagion trading, meaning they systematically sell stocks from one country when stock prices are falling in another. In addressing this second set of questions, we establish a first, direct empirical link between contagion and trading strategies.

The methodological contribution of the paper is our approach to attributing

[1] Work subsequent to ours on the trading of international mutual funds has begun to appear. See, e.g., Borensztein and Gelos (2000) and Gelos and Wei (2002).

[2] There are many differences between mutual funds and other institutions (such as pension funds and insurance companies) that might affect trading strategies. For example, mutual funds generally involve greater investor scrutiny of short-horizon performance, greater exposure to fluctuations in investor inflows/outflows, and tighter links between manager compensation and total assets under management.

[3] An advantage of our data set is that it includes trades settled in foreign currencies, for example, ADR trades in New York and Brady bonds (cf., Froot et al., 2001). These trades are important in times of crisis when local-market liquidity is at a minimum. For Latin American countries, even in normal times many stocks trade more in New York (as ADRs) than on the local market (see Claessens et al., 2002).

actions to fund managers versus underlying investors.[4] Despite a vast literature on the behavior of domestic (i.e., US) funds, to our knowledge we are the first to disentangle the two. To the extent that the trading strategies of these investor groups differ, separating them is an important step.

Our results show that emerging-market mutual funds do indeed engage in momentum trading. Their strategies exhibit positive momentum—they systematically buy winners and sell losers. This is due to momentum trading by both fund managers and fund investors (the latter through redemptions/inflows). We further distinguish between contemporaneous momentum trading (buying current winners and selling current losers) and lagged momentum trading (buying past winners and selling past losers). Contemporaneous momentum trading is stronger during crises, and equally strong for managers and investors. Lagged momentum trading is stronger for fund managers. We also provide first evidence of contagion trading: funds systematically sell (buy) assets from one country when asset prices fall (rise) in another. Contagion trading is practiced by both managers and investors, but is more prevalent among investors.

The paper is organized as follows. The next section outlines our approach to measuring momentum trading and contagion trading. Section 3 describes our data. Section 4 presents our momentum and contagion results. Section 4.2 addresses whether return autocorrelation within Latin America can rationalize our Section 4 results. Section 5 concludes.

## 2. Strategies: momentum trading and contagion trading

This section presents our approach to testing whether funds employ momentum and contagion trading strategies. Momentum trading is the systematic purchase of stocks that have performed well, and sale of stocks that have performed poorly ('winners' and 'losers'). Contagion trading is the selling (buying) of assets from one country when asset prices are falling (rising) in another. Contagion trading is thus a cross-country phenomenon, in contrast to momentum trading, which is a within-country phenomenon. (This type of cross-country analysis is not possible using recent single-country data sets, such as those of Choe et al., 1999; Kim and Wei, 2002.)

First, we review the existing finance literature on momentum trading. Second,

[4] It would not be precise to refer to this as separating institutional from individual decisions: some underlying investors are themselves institutions (like pension funds, for example). (We thank one of the referees for this clarification.) Our data sources do not include the information needed to disaggregate our underlying investors further. Nevertheless, the distinction between fund managers and underlying institutional investors is still likely to be interesting because they typically face different motivations (e.g., fee income versus returns) and constraints (e.g., on holding cash or derivatives). For more on the international strategies of individuals versus institutions per se, see Kim and Wei (2002).

we present our approach to testing for momentum trading, an approach that draws from this earlier literature. Then we turn to contagion trading, presenting first a brief review of the 'contagion' literature, followed by our approach to testing for contagion trading. The approach we adopt in testing for contagion trading is in the same spirit as our test for momentum trading.

### 2.1. Introduction to momentum trading

The literature on momentum trading in stock markets includes two lines of work, one based in asset pricing and the other based in international finance. The asset-pricing line begins with the finding that buying past winners and selling past losers generates significant positive returns over 3- to 12-month holding periods (Jegadeesh and Titman, 1993; Asness et al., 1997; Rouwenhorst, 1998).[5] Once established, this result inspired work on whether investors actually follow momentum trading strategies. Grinblatt et al. (1995), for example, examine the domestic strategies of US mutual funds and find that they do systematically buy past winners. They do not systematically sell past losers, however. They also find that funds using momentum trading strategies realize significantly higher returns. Evaluation of performance is a central theme for all the papers in this asset-pricing line of the literature.

The second line of work on momentum trading is based in international finance. Its organizing theme is the link between returns and international capital flows. At the center of this literature is the positive contemporaneous correlation between capital inflows and returns. Early work establishes this correlation using data aggregated over both time and types of market participant (Tesar and Werner, 1994; Bohn and Tesar, 1996). Later work relaxes the aggregation over time to address whether the contemporaneous correlation in quarterly data is truly contemporaneous (Froot et al., 2001; Choe et al., 1999; Kim and Wei, 2002). Higher frequency data can distinguish three possibilities. Returns may precede flows, indicating positive feedback trading (which is not necessarily irrational, given that returns in emerging market equities are positively auto-correlated). Returns and flows may be truly contemporaneous, indicating that order flow itself

[5] The return 'continuations' that are implied by this result are not inconsistent with the return 'reversals' documented elsewhere in the literature. Horizon length is the key to understanding this: continuations appear at mid-range horizons, 3–12 months. Return reversals, in contrast, appear at short horizons (up to 1 month, see Jegadeesh, 1990; Lehmann, 1990) and at long horizons (3–5 years, see De Bondt and Thaler, 1985). Reversals call for 'contrarian' (or negative feedback) trading strategies. Parenthetically, all these time-series anomalies are distinct from the cross-sectional anomalies that have received much attention in the asset-pricing literature recently (e.g., size and book-to-market effects).

may be driving prices.[6] And returns may lag flows, indicating flows' ability to predict returns. Using high-frequency data aggregated across types of market participant, Froot et al. (2001) find evidence of all three, with the first—positive feedback trading—being the most important for explaining quarterly correlation. Choe et al. (1999) and Kim and Wei (2002) use high-frequency data from Korea to examine positive feedback trading around the 1997 currency crisis. Choe et al. find that foreign investors as a group engage in positive feedback trading before the crisis, but during the crisis feedback trading mostly disappears. Kim and Wei examine foreign institutional investors separately and find that they engage in positive feedback trading at all times—before, during, and after the crisis.

Our analysis is related to, and borrows from, both the international-finance and asset-pricing lines of the literature. Like the work in international finance, we are more concerned about international flows and crisis transmission than portfolio performance. Like work in asset pricing, however, we maintain a direct link to investment strategy and its measurement. In particular, we focus on a specific class of international investor—mutual funds. A benefit of focusing on a specific investor class is that we can characterize the evolution of actual portfolios, and how that evolution relates to returns in various countries. Another benefit is that our data allow us to analyze jointly the behavior of fund managers and their underlying investors. On the cost side, focusing on funds as a specific investor class means that we lose resolution in terms of data frequency: our data are quarterly.

### *2.2. Measuring momentum trading*

Our momentum-trading measure is akin to that used to analyze funds' domestic strategies (e.g., Grinblatt et al., 1995). The measure captures the relation between security transactions and returns. It is based on the mean of individual observations of the variable:[7]

$$M_{i,j,t,k} = \left( \frac{Q_{i,j,t} - Q_{i,j,t-1}}{\bar{Q}_{i,j,t}} \right) R_{j,t-k}, \tag{1}$$

[6] Microstructure finance provides three channels for contemporaneous price impact. The first is information about a stock's future dividends—if a seller has superior information, then the sale can signal that information, shifting expectations, and thereby reducing price. The second is incomplete risk sharing at the marketmaker level—the sale requires the marketmaker to take on the long position, at least for a time, and this risk requires the seller to pay compensation in the form of a lower sale price (temporary 'inventory effects'). The third is imperfect substitutability—the sale may be a large enough relative to the market as a whole that permanently lower price is required to induce buyers to purchase the unchanged dividend stream.

[7] Our estimates of the mean of this variable do not value-weight the individual stock positions. This could make a difference if the intensity of momentum trading differs depending on position value. After calculating it both ways, we did not find any qualitative difference in the results.

where $Q_{i,j,t}$ is the holding by fund $i$ of stock $j$ (in shares) at time $t$, $\bar{Q}_{i,j,t}$ is $(Q_{i,j,t} + Q_{i,j,t-1})/2$, and $R_{j,t-k}$ is the return on stock $j$ from $t-k-1$ to $t-k$.[8] When $k=0$, this measure captures the contemporaneous relation between trades and returns—referred to as lag-zero momentum trading (**L0M**). When $k=1$, the measure captures the lagged response of trades to returns, and is referred to as lag-one momentum trading (**L1M**)—also called feedback trading. Parenthetically, notice the implication of the $j$ subscript: the mean of $M_{i,j,t,k}$ measures the intensity of momentum trading at the level of individual stocks. Testing the null of no momentum trading is a test of whether the mean of $M_{i,j,t,k}$ over all $i$, $j$, $t$, and $k$ is zero.

This measure of momentum trading has two important advantages. First, it is not contaminated by 'passive price momentum.' Passive price momentum arises in momentum trading measures—like those of Grinblatt et al.—where the term in brackets is a change in portfolio weight, rather than a percentage quantity adjustment. When using a portfolio weight, a price increase in one stock (relative to prices of other holdings) produces a positive relation between weights and returns that has nothing to do with trading strategy. (Of course, a similar positive relation arises for losing stocks.) The second advantage of our measure over one based on portfolio weights is that our measure is not contaminated by another passive effect— 'passive quantity momentum': when using portfolio weights, a large trade in one stock can have substantial effects on the weights of other holdings that involve no transactions. Our main concern here—as in the rest of the international-finance-based literature on momentum trading—is the relation between returns and transaction flows.[9] Accordingly, we want our realizations of $M_{i,j,t,k}$ to reflect actual transactions—the buying and selling of winners and losers.

*2.2.1. Separating manager and investor momentum trading*

An important issue in the context of mutual-fund strategies is the effect of net redemptions. Many funds experience substantial redemptions during crisis periods. If, on average, funds sell shares to meet redemptions when $R_{j,t-k}$ is negative, then our momentum trading measures will be positive. This result is not spurious. But it does reflect strategies of underlying investors rather than strategies of the fund manager.

We control for this redemption effect by measuring the quantity transacted in each stock relative to a fund-specific benchmark. This benchmark reflects the

[8] Using the average number of shares $Q$ in the denominator avoids a problem that arises from using either the beginning or ending $Q$ alone: because the beginning or ending $Q$ may be zero, using only one of them would produce a division-by-zero problem for some observations.

[9] This contrasts with the asset-pricing literature on momentum, whose main concern is portfolio performance, for which it is necessary to consider the return on all portfolio positions. Note too that emerging-market funds are subject to large and rapid redemptions, which can produce significant passive quantity momentum: differential liquidity across markets can concentrate sales in high liquidity markets.

quantity that would be transacted if a fund's net flows from investors produced proportional adjustment in all stocks. Specifically, to isolate the manager's contribution to momentum trading we calculate individual observations of:

$$M'_{i,j,t,k} = \left( \frac{Q_{i,j,t} - Q_{i,j,t-1}}{\bar{Q}_{i,j,t}} - \underset{j \in S(i)}{\text{median}} \left( \frac{Q_{i,j,t} - Q_{i,j,t-1}}{\bar{Q}_{i,j,t}} \right) \right) R_{j,t-k}, \quad (2)$$

where we use the notation $j \in S(i)$ to denote those stocks $j$ within the set of stocks held by fund $i$. The median term is the percentage quantity transacted if a fund's net flows from investors produced proportional quantity adjustment in all stocks. (We use the median to mitigate effects from outliers and measurement error; more on sensitivity below.[10]) For a simple example, consider an equal-weighted portfolio with only three stocks in a period where prices do not change, and suppose that in response to an investor redemption of 5% the manager sells 10% of one position, 5% of another, and 0% of the third. The second term reflects the median position change of 5% (actually, 5.1%, or 5/97.5, to account for use of average quantities in the denominator; see Footnote 7). The overall momentum trading measure in Eq. (2) therefore reflects the degree to which the manager of fund $i$ buys winners and sells losers beyond the proportional-adjustment benchmark. As with our first momentum trading measure, when $k=0$ $M'_{i,j,t,k}$ captures the contemporaneous relation between trades and returns—L0M—and when $k=1$ $M'_{i,j,t,k}$ captures the lagged response of trades to returns—L1M. Under the null hypothesis of no momentum trading at the manager level, the mean of the observations $M'_{i,j,t,k}$ is zero.

A natural concern is whether our manager-only momentum measure is sensitive to the particular specification we use for the redemption/inflow adjustment. There are really two components to that specification choice: (i) use of the median and (ii) use of percentage of shares transacted rather than percentage of value transacted. As noted, the median measure attenuates outlier effects, which can be significant during crises. (Use of means does not alter our main findings.) The second component of that specification choice is subtler. On the plus side, using the percentage of shares transacted avoids a significant source of potential measurement error that is present when using the percentage value transacted. For the latter, one needs to use average prices over a period to aggregate quantities (because transaction prices for intra-period trades are not available). This introduces measurement error that is a function of the gaps between actual

[10] We are grateful to the Editor for suggesting this variation on our original specification in Kaminsky et al. (2000), which netted the mean of the second term in brackets rather than the median. With an approximately symmetric distribution, we expect that the median is a more robust estimator of the mean in our sample. (Also, as noted below, the statistics we report are based on observations with three standard deviations of the mean, so any asymmetries in the far tails are not responsible for differences in the mean and median measures.).

transaction prices and average prices over the transaction period. (It is straightforward to show that when measuring percentage value changes using average prices, inflows are overestimated when they induce purchases at prices below the period's average price; intuitively, they are mistakenly valued at the too-high average price. Similarly, outflows are overestimated if they induce sales at prices below the period's average price.)

Measuring the percentage of shares transacted is not, however, immune to measurement error, in part because it excludes those same prices. Suppose, for example, that a fund manager receives an inflow and decides that after his purchases he wants his portfolio holdings to match his pre-inflow holdings in value terms. This will not imply equal percentage changes in share quantities if either his trades occur over time, with attendant relative price changes, or if his trades themselves have differential price impact across stocks, even if executed simultaneously. All in, the adjustment for redemptions/inflows we use here is in our judgment less prone to measurement error than the original one we proposed in Kaminsky et al. (2000).[11]

We can also examine investor-level momentum in isolation. For this we must recognize that investors' decisions are made at the level of the fund, not at the level of individual stocks. (Manager decisions, in contrast, *are* made at the level of individual stocks). To capture this, we estimate the investor-only measure at the fund level. Specifically, we estimate the mean of the statistic:

$$M''_{i,j,t,k} = \underset{j \in S(i)}{\text{median}} \left( \frac{Q_{i,j,t} - Q_{i,j,t-1}}{\bar{Q}_{i,j,t}} \right) R_{i,t-k} \tag{3}$$

where $R_{i,t-k}$ is the change in fund $i$'s Net Asset Value (NAV) in period $t-k$. Clearly, this reduces the number of observations—we lose the stock dimension—but it does correspond to the decision that investors actually face.

To separate crisis behavior from non-crisis behavior, we split our sample into crisis and non-crisis sub-periods. Within our full sample (April 1993 to January 1999), the crisis portion includes four sub-periods: December 1994 to June 1995 (Mexico), July 1997 to March 1998 (Asia), August 1998 to December 1998 (Russia), and November 1998 to January 1999 (Brazil).[12] (Because our analysis does not examine the Brazilian crisis separately, the overlap in our sample between

[11] See that earlier version for results using an adjustment based on percentage value transacted. The main results of the paper are unchanged by this specification shift. In response to a referee, we also tried several variations on the specification in that earlier version that factored out the capital gains/losses in different ways. We found that those variations, too, produced the same basic messages: strong evidence of momentum trading (at both lags 0 and 1) and contagion trading.

[12] We also examined whether momentum trading is different on the buy and sell sides, i.e., buying winners and selling losers need not be symmetric. To do so, we split our sample into buys and sells (as in Grinblatt et al., 1995). We found, however, that our results were extremely sensitive to the specification of expected returns, an adjustment that is necessary when splitting buys from sells (see Grinblatt et al., 1995, p. 1091). We do not report those results due to their fragility.

that crisis and the Russian crisis is not an issue.) We define a crisis observation as one that contains at least one of these crisis months. A natural variation on these crisis-period definitions is to treat the July 1997 to January 1999 period as an unbroken period of crisis. We find that this variation has no substantive effect on our crisis versus non-crisis results.

*2.2.2. Statistical inference*

Several inference issues deserve further attention. First, the percentage quantity changes—the term in parentheses in Eqs. (1)–(3)—may have fund-specific volatilities. Two factors could account for differing volatilities at the fund level. The first is the considerable cross-sectional difference in fund size—size can affect trading strategies. The second is fund differences that are distinct from size, such as turnover ratios, redemption penalties, and other factors. Below, we test for heteroskedasticity across funds *i*, and after finding it, we correct for it (White correction).[13]

While the first inference issue pertained to heterogeneity across funds, a second inference issue pertains to dependence across observations within funds. Specifically, individual observations of our various momentum trading statistics, $M_{i,j,t,k}$, are unlikely to be independent across stocks within a given fund. We account for dependence across stocks within a given fund using the procedure developed by Huber (1967) and Rogers (1993). Intuitively, this estimator groups observations for a given fund when calculating the coefficient variance-covariance matrix, so as not to attribute too much information content to dependent observations.

A third inference issue that warrants attention is the possibility that our momentum trading measures might be biased due to high return volatility, which is clearly a feature of our crisis-ridden sample (see Forbes and Rigobon, 2002). In fact, we are not exposed to this bias under our null of no momentum trading, because under our null the statistics we report in Tables 1–4 are equal to zero. Under this null the bias analyzed by Forbes and Rigobon is not present.[14]

[13] Because our heteroskedasticity correction affects only standard errors, each observation of $M_{i,j,t}$ gets equal weight in the calculation of a momentum measure's mean. Our correction for heteroskedasticity therefore does not alter the fact that funds with more observations have more effective weight. Regrettably, we have little statistical power to explore whether funds differ appreciably in the intensity of their momentum trading. As for heteroskedasticity in the time-series dimension, our sample partition into crisis and non-crisis periods accounts for the most obvious correction.

[14] Under the alternative hypothesis of non-zero measures, precise statistical comparisons across crisis and non-crisis sub-samples would require an adjustment for the volatility-specific nature of the sample split. For the measures in this paper, the form of the adjustment is quite complex and have not been determined elsewhere in the literature (i.e., they are not a simple application of the adjustment in Forbes and Rigobon, 2002). In an earlier version (Kaminsky et al., 2000), we present regression results that are not subject to this potential bias even under the alternative of non-zero measures; they are broadly consistent with the results we report here.

Table 1
Lag-0 and Lag-1 momentum trading

| | All sample | Non-crisis | Crisis |
|---|---|---|---|
| *Manager-only momentum* | | | |
| L0M | 1.19*** | 0.56** | 2.45*** |
| S.D. | 0.29 | 0.23 | 0.72 |
| *t*-Statistic | 4.09 | 2.47 | 3.39 |
| Observations | 4927 | 3287 | 1640 |
| L1M | 0.29*** | 0.27*** | 0.35** |
| S.D. | 0.08 | 0.08 | 0.17 |
| *t*-Statistic | 3.75 | 3.29 | 1.99 |
| Observations | 4848 | 3211 | 1637 |
| *Investor-only momentum* | | | |
| L0M | 1.44*** | 0.49*** | 3.10*** |
| S.D. | 0.39 | 0.18 | 0.91 |
| *t*-Statistic | 3.69 | 2.75 | 3.42 |
| Observations | 126 | 80 | 46 |
| L1M | −0.05 | 0.08 | −0.25 |
| S.D. | 0.13 | 0.14 | 0.28 |
| *t*-Statistic | −0.36 | 0.58 | −0.88 |
| Observations | 122 | 76 | 46 |

L0M is the point estimate for the mean of the momentum trading measure at lag 0. L1M is the point estimate for the mean of the momentum trading measure at lag 1 (measured from return over the previous month). Manager-only momentum tests whether the mean of $(\Delta Q_{ijt}/\bar{Q}_{ijt} - K)R_{jt-k}$ is zero, where the term $K$ controls for investor redemption effects (defined in Eq. (2)). Investor-only momentum reflects investor redemption effects at the fund level as in Eq. (3). All standard errors are corrected for heteroskedasticity across funds (White correction) and dependence within funds (Huber, 1967; Rogers, 1993). Full sample: quarterly data from April 1993 to January 1999. The crisis portion of the sample is December 1994–June 1995, July 1997–March 1998, and August 1998–January 1999. The non-crisis portion is the rest of the sample. The number of observations for the manager-only measure is the product of the number of funds (13), the number of stocks per fund (averages about 38), and the number of available quarterly observations per fund (averages about 10). Observations for the investor-only measure do not include the stock dimension (i.e., only funds times quarters). For robustness, results in each cell are based only on observations within three standard deviations of the mean. *, **, and *** Denote statistical significance at the 10, 5, and 1% levels, respectively.

### 2.3. Introduction to contagion

The financial crises of the 1990s in Europe, Mexico, Asia, Russia, and Brazil spread rapidly across countries, including countries with diverse market fundamentals.[15] These events spawned a literature to make sense of the seeming

[15] Witness Indonesia in 1997. Nobody can disagree that there were signs of weakness in the Indonesian economy at the outset of the Asian crisis: the banking sector was fragile, the economy was not growing, and there was a current account deficit. Still, these problems were not insurmountable. Kaminsky (1998), for example, estimates that the probabilities of crisis in Indonesia by June 1997 amounted to only 20%. This probability stands in sharp contrast to the likelihood of a currency crisis in Thailand, which skyrocketed to 100% at the beginning of 1997 (months before the crisis actually began). Still, the Indonesian rupiah collapsed only weeks after the floating of the Thai baht.

Table 2
Manager-only momentum trading by individual crisis

| | Mexican crisis | Asian crisis | Russian crisis |
|---|---|---|---|
| L0M | 3.53* | 1.48*** | 3.75*** |
| S.D. | 1.88 | 0.50 | 1.08 |
| *t*-Statistic | 1.88 | 2.96 | 3.46 |
| Observations | 276 | 920 | 413 |
| L1M | 1.27*** | −0.06 | 0.48 |
| S.D. | 0.41 | 0.22 | 0.32 |
| *t*-Statistic | 3.10 | −0.26 | 1.50 |
| Observations | 297 | 898 | 412 |

L0M is the point estimate for the mean of the momentum trading measure at lag 0. L1M is the point estimate for the mean of the momentum trading measure at lag 1 (measured from return over the previous month). Manager-only momentum tests whether the mean of $(\Delta Q_{ijt}/\bar{Q}_{ijt} - K)R_{jt-k}$ is zero, where the term $K$ controls for investor redemption effects (defined in Eq. (2)). All standard errors are corrected for heteroskedasticity across funds (White correction) and dependence within funds (Huber, 1967; Rogers, 1993). The Mexican Crisis portion of the sample is December 1994–June 1995. The Asian Crisis portion of the sample is July 1997–March 1998. The Russian Crisis portion of the sample is August 1998–December 1998. For robustness, results in each cell are based only on observations within three standard deviations of the mean. *, **, and *** Denote statistical significance at the 10, 5, and 1% levels, respectively. Because the investor-only measure is calculated at the fund level rather than the stock level, there are too few observations in that case to break the crisis sample into separate crises.

'contagion.' The term contagion is used quite differently by different authors, however, so let us be more specific. The literature on contagion identifies three types: fundamental-spillover contagion, common-cause contagion, and non-fundamental contagion. Fundamental-spillover contagion occurs when an inside disturbance is rapidly transmitted to multiple, economically interdependent countries. Common-cause contagion occurs when an outside disturbance is rapidly transmitted to multiple countries (e.g., a fall in commodity prices, or learning about common fundamental factors). Fundamental disturbances underlie both of these first two types. The third type—non-fundamental contagion—can stem from any kind of disturbance; the defining characteristic is that the rapid transmission to multiple countries is beyond what is warranted by fundamentals (i.e., controlling for fundamentals cannot account for it). This third type is sometimes referred to as pure or true contagion.

Many authors focus on the first two types of contagion, those driven by fundamentals. For example, Eichengreen et al. (1996) examine whether contagion is more prevalent among countries with either important trade links or similar market fundamentals. In the first case, devaluation in one country reduces competitiveness in partner-countries, prompting devaluations to restore competitiveness (fundamental-spillover contagion). In the second case, devaluation acts like a wake-up call: investors seeing one country collapsing learn about the

Table 3
Contagion trading results

| | Foreign stock market index | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Brazil | | | Mexico | | | Asia | | | Russia | | | US | | |
| *Statistics* | All sample | Non-crisis | Crisis | All sample | Non-crisis | Crisis | All sample | Non-crisis | Crisis | All sample | Non-crisis | Crisis | All sample | Non-crisis | Crisis |
| *Manager only* | | | | | | | | | | | | | | | |
| L0C | 2.70*** | 1.67*** | 4.79*** | 0.33** | 0.01 | 0.97* | 0.21 | 0.13 | 0.36 | 0.36 | −0.31 | 1.40* | −0.17 | −0.09 | −0.32 |
| S.E. | 0.70 | 0.54 | 1.75 | 0.16 | 0.15 | 0.52 | 0.15 | 0.11 | 0.38 | 0.54 | 0.96 | 0.78 | 0.11 | 0.08 | 0.23 |
| *t*-Statistic | 3.84 | 3.09 | 2.73 | 2.03 | 0.06 | 1.88 | 1.37 | 1.20 | 0.93 | 0.66 | −0.32 | 1.79 | −1.53 | −1.14 | −1.37 |
| *Investor only* | | | | | | | | | | | | | | | |
| L0C | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | 0.35** | 0.31*** | 0.43 | 1.76*** | 1.17* | 2.67* | −0.15** | −0.06 | −0.33* |
| S.E. | | | | | | | 0.17 | 0.10 | 0.35 | 0.64 | 0.62 | 1.43 | 0.07 | 0.05 | 0.17 |
| *t*-Statistic | | | | | | | 2.10 | 3.20 | 1.22 | 2.76 | 1.88 | 1.87 | −2.18 | −1.24 | −1.93 |

L0C denotes lag-0 contagion trading. Manager-only contagion tests whether the mean of $(\Delta Q_{ijt}/\bar{Q}_{ijt} - K)R_{ft}$ is zero, where the term $K$ controls for investor redemption effects and $R_{ft}$ is the net return on foreign index $f$ from $t-1$ to $t$, with $f \in$ {Brazil, Mexico, Asia, Russia, US}. See Eq. (4) for the definition of $K$ and the calculation of the net foreign return. Investor-only contagion reflects only investor redemption effects as in Eq. (5). All standard errors are corrected for heteroskedasticity across funds (White correction) and dependence within funds (Huber, 1967; Rogers, 1993). Full sample: April 1993 to January 1999. The crisis portion of the sample is December 1994–June 1995, July 1997–March 1998, and August 1998–January 1999. The non-crisis portion is the rest of the sample. Asia is the IFC Asia Stock Market Index. Note that Brazilian equities are excluded from the calculation of L0C for Brazil (similarly for Mexico). *, **, and *** Denote statistical significance at the 10, 5, and 1% levels, respectively. The lower left-hand cells are not applicable for the investor-only measure because underlying investors can only choose to buy or sell the Latin American fund, they cannot choose to buy or sell the non-Brazil or non-Mexico parts of those funds.

Table 4
Manager-only contagion trading by individual crisis

| | Mexico during Mexican crisis | Asia during Asian crisis | Russia during Russian crisis | US during Mexican crisis | US during Asian crisis | US during Russian crisis |
|---|---|---|---|---|---|---|
| *Statistic* | | | | | | |
| L0C | 2.43 | 0.78 | 7.49*** | −1.71** | −0.20 | 0.44** |
| S.E. | 1.71 | 0.72 | 2.82 | 0.80 | 0.14 | 0.17 |
| *t*-Statistic | 1.43 | 1.08 | 2.66 | −2.13 | −1.44 | 2.54 |

L0C denotes lag-0 contagion trading. Manager-only contagion tests whether the mean of $(\Delta Q_{ijt}/\bar{Q}_{ijt} - K)R_{ft}$ is zero, where the term $K$ controls for investor redemption effects and $R_{ft}$ is the net return on foreign index $f$ from $t-1$ to $t$, with $f \in$ {Brazil, Mexico, Asia, Russia, US}. See Eq. (4) for the definition of K and the calculation of the net foreign return. All standard errors are corrected for heteroskedasticity across funds (White correction) and dependence within funds (Huber, 1967; Rogers, 1993). The Mexican Crisis portion of the sample is December 1994–June 1995. The Asian Crisis portion of the sample is July 1997–March 1998. The Russian Crisis portion of the sample is August 1998–December 1998. Asia is the IFC Asia Stock Market Index. Note that Mexican equities are excluded from the calculation of L0C for Mexico. *, **, and *** Denote statistical significance at the 10, 5, and 1% levels, respectively. Because the investor-only measure is calculated at the fund level rather than the stock level, there are too few observations in that case to break the crisis sample into separate crises.

fragility of 'similar' countries, and speculate against those countries' currencies (common-cause contagion). The Eichengreen et al. evidence points in the direction of trade links rather than similar fundamentals. Corsetti et al. (1999) also claim that trade links drive the strong spillovers during the Asian crisis. Kaminsky and Reinhart (2000) focus instead on financial-sector links. In particular, they examine the role of common bank lenders and the effect of cross-market hedging (a type of common-cause contagion). They find that common lenders were central to the spreading of the Asian crisis (as they were to the spreading of the Debt Crisis of the 1980s).

The non-fundamental category of contagion has attracted more attention than the two fundamentals-driven categories. Theoretical work on non-fundamental contagion focuses on rational herding. For example, in the model of Calvo and Mendoza (2000), the costs of gathering country-specific information induce rational investors to follow the herd. In the model of Calvo (1999), uninformed investors replicate selling by liquidity-squeezed informed investors because the uninformed mistakenly (but rationally) believe these sales are signaling worsening fundamentals. Kodres and Pritsker (2002) focus on investors who engage in cross-market hedging of macroeconomic risks. In that paper, international market comovement can occur in the absence of any relevant information, and even in the absence of direct common factors across countries. For example, a negative shock to one country can lead informed investors to sell that country's assets and buy assets of another country, increasing their exposure to the idiosyncratic factor of that second country. Investors then hedge this new position by selling the assets of

a third country, completing the chain of contagion from the first country to the third.

The literature on non-fundamental contagion also has an empirical branch. Kaminsky and Schmukler (1999) find that spillover effects unrelated to market fundamentals are quite common, and spread quickly across countries within a region. Valdes (1998) examines the degree to which comovement of Brady-bond prices is unexplained by fundamentals. Interestingly, contagion in his paper is symmetric, applying both on the downside during crises and on the upside during periods of rapid capital inflow. A different line of empirical work on non-fundamental contagion examines whether crises are spread by particular investor groups. For example, Choe et al. (1999) use transaction data in the Korean equity market to examine whether foreign investors destabilize prices. They find evidence of herding by foreign investors before Korea's economic crisis in late 1997, but these effects disappear during the peak of the crisis, and there is no evidence of destabilization. Since their data include only transactions on the Korean Stock Exchange, these authors cannot examine the transmission of crisis across countries.

### *2.4. Measuring contagion trading*

Our approach to testing for contagion is new to the literature. Data on individual portfolios allow us to address contagion in a new way—from the trading-strategy perspective. We will use the term **contagion trading** to mean the systematic selling (buying) of stocks in one country when the stock market falls (rises) in another.[16]

To do this we introduce a new measure—a contagion trading measure. Our contagion trading measure is based on the methodology outlined above for measuring momentum trading. Like the momentum measures, we shall focus on contagion trading measures at two different levels: manager-only contagion trading ($C'$) and investor-only contagion trading ($C''$). These two measures are sample averages of the variables:

$$C'_{i,j,t} = \left( \frac{Q_{i,j,t} - Q_{i,j,t-1}}{\bar{Q}_{i,j,t}} - \underset{j \in S(i)}{\text{median}} \left( \frac{Q_{i,j,t} - Q_{i,j,t-1}}{\bar{Q}_{i,j,t}} \right) \right) (R_{f,t} - \beta_{f,h} R_{h,t}) \tag{4}$$

$$C''_{i,j,t} = \underset{j \in S(i)}{\text{median}} \left( \frac{Q_{i,j,t} - Q_{i,j,t-1}}{\bar{Q}_{i,j,t}} \right) (R_{f,t} - \beta_{f,h} R_{h,t}) \tag{5}$$

Instead of testing for a relation between quantity changes and own-stock returns,

[16] Notice that this definition does not take account of the fundamental-versus-non-fundamental distinction introduced above. Below we address results from a regression-based approach that allows testing for contagion with the addition of controls for various fundamental factors.

these contagion trading measures test for a relation between quantity changes and equity returns in foreign countries. In effect, we are testing for 'cross-country momentum trading.' Here, $R_{f,t}$ is the return on the foreign equity index $f$ from $t-1$ to $t$ and $R_{h,t}$ is the return on the home equity index for the same period. Under the null hypothesis of no contagion trading, the mean of the observations $C_{i,j,t}$ is zero.

We consider five different foreign indexes when calculating the contagion trading measures: Brazil, Mexico, Asia, Russia, and the US. (When calculating the contagion trading measure when $f$ equals Brazil or Mexico, we do not include observations for any stocks from those two countries.) These foreign returns are netted of average co-movement with each stock's home-country return since these underlying co-movements are not what people have in mind when using the term contagion. Thus, to determine the contribution to our contagion-trading measure of stock $j$ from home country $h$, we ask whether trading in stock $j$ is correlated with the orthogonal component of foreign returns—the component beyond what one would expect given returns in $h$. The return betas are estimated from the full sample using OLS (includes constant).

Our contagion trading measure in Eqs. (4)–(5) allows us to address many of the issues we address with our momentum trading measure. For example, we examine crisis versus non-crisis sub-samples, and we partition the crisis sub-sample further to isolate the effects of particular crises.

## 3. Data

Our data on mutual-fund holdings come from two sources. The first source is the US Securities and Exchange Commission (SEC). Mutual funds are required to report holdings to the SEC twice a year. The second source is Morningstar. Morningstar conducts surveys of mutual fund holdings at a higher frequency: quarterly surveys are the norm for most funds. For our purposes, quarterly data are available from Morningstar for about 50% of the funds we examine. In those instances where our measure of $M_{i,j,t}$ is based on portfolio holdings that are not measured 3 months apart, these observations of $\Delta Q_{i,j,t}$ are multiplied by $3/x$, where $x$ is the number of months between $Q_{i,j,t}$ and $Q_{i,j,t-1}$.

Our sample includes the holdings of 13 Latin America equity funds (open-end) from April 1993 to January 1999 (24 quarters). Those funds are (1) Fidelity Latin America, (2) Morgan Stanley Dean Witter Institutional Latin America, (3) Van Kampen Latin America (formerly Morgan Stanley), (4) BT Investment Latin America Equity, (5) TCW Galileo Latin America Equity, (6) TCW/Dean Witter Latin America Growth, (7) Excelsior Latin America, (8) Govett Latin America, (9) Ivy South America, (10) Scudder Latin America, (11) T. Rowe Price Latin America, (12) Merrill Lynch Latin America, and (13) Templeton Latin America.

Not all of these funds existed from the beginning of our sample; on average we have about 10 quarters of data (out of a possible 24) per fund.

We also access data from Bloomberg and the International Finance Corporation (IFC). Bloomberg provides monthly price series for all equities held by the 13 funds, including ADRs. (The need for monthly price data arises in our analysis of lag-one momentum trading.) These price series are corrected for splits and dividends. The IFC provides information on stock market indexes, which we need for our contagion trading analysis. Our contagion trading analysis uses the IFC Latin America Stock Market index, the IFC Asia Stock Market index, and several IFC country stock market indexes. The US equity return is the S&P 500 return. All return data are expressed in percent dollar returns.

As noted above, within our full sample from April 1993 to January 1999 the crisis portion includes four sub-periods: December 1994 to June 1995 (Mexico), July 1997 to March 1998 (Asia), August 1998 to December 1998 (Russia), and November 1998 to January 1999 (Brazil). A crisis observation is one that contains at least one of the crisis months above. Our main findings are robust to reasonable variations on these dates, such as treating the whole of the July 1997 to January 1999 period as a crisis period.

## 4. Results: momentum and contagion trading

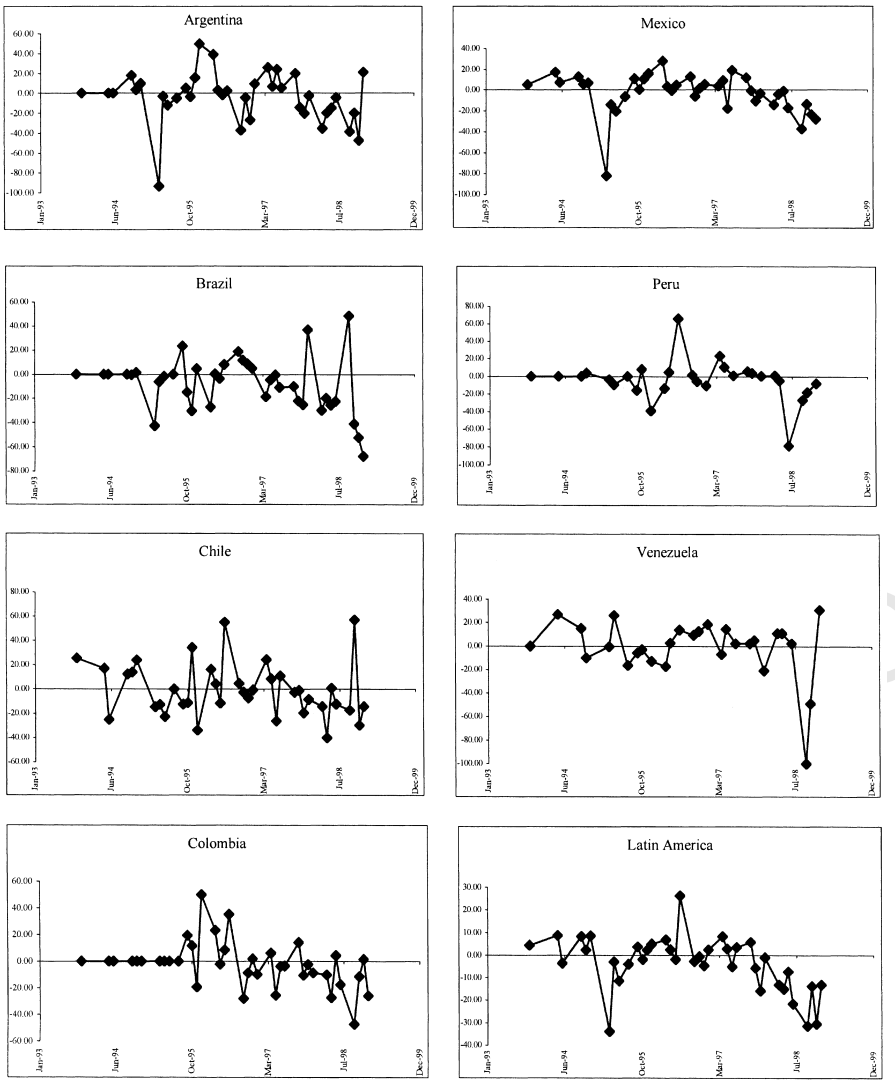
We present our results in three parts. First we present evidence based on the aggregated trading activity of all the funds in our sample. Then we present results for within-country momentum trading (Eqs. (2) and (3)). We follow these with cross-country contagion trading results (Eqs. (4) and (5)).

### *4.1. Aggregated activity of our sample funds*

Though our data set does include individual portfolios, let us first consider evidence based on the aggregation of those portfolios. We focus this aggregate evidence on funds' experience with investor inflows and outflows. During the fourth quarter of 1997—the peak of the Asian crisis—Latin American funds suffered large outflows (Fig. 1).[17] The reversal from inflows to outflows during the Asian and Russian crises is more severe than that during the Mexican crisis in December 1994. In the Mexican crisis, funds tended to pull out of Mexico, Argentina, and Brazil, all of which are relatively liquid; funds tended not to pull out from more illiquid markets, such as Colombia. Moreover, the Mexico-induced pullout was temporary—by the third quarter of 1995 fund inflows to Latin

[17] Net selling in Fig. 1 is calculated as the change in number of shares—as a percentage of average shares held during the quarter—valued at the beginning-of-quarter price. The average shares held during the quarter is the mean of the beginning- and end-of-quarter holdings.

664




Net Buying/Selling is equal to the value-weighted percentage change in quarterly holdings of all of our sample funds in each country, where the value weighting uses the beginning-of-period share price. All figures are in percent. (Since quarterly change in the number of shares is divided by the mean number of shares, where the latter is the beginning number of shares plus the ending number divided by two, changes can be greater than 100 percent.)

665

666 Fig. 1. Mutual funds' net buying/selling of stocks in Latin America. Net buying/selling is equal to the
667 value-weighted percentage change in quarterly holdings of all of our sample funds in each country,
668 where the value weighting uses the beginning-of-period share price. All figures are in percent. (Since
669 quarterly change in the number of shares is divided by the mean number of shares, where the latter is
670 the beginning number of shares plus the ending number divided by two, changes can be greater than
671 100%.)

America had resumed (consistent with the findings of Marcis et al., 1995; Rea, 1996). Relative to the Mexican crisis, the Asian and Russian crises of 1997 and 1998 were more broad-based and persistent. In those crises the retreat from Latin America was more indiscriminate, with heavy sales reaching even the most illiquid markets. On average, net sales in 1998 were about 32%. This result differs from that of Froot et al. (2001), who find little evidence of net outflows during the Asian crisis. A possible explanation is that the aggregated data used by Froot et al. include institution types that counteract the clear net selling by mutual funds (hedge funds?). Another possible explanation is that the Froot el al. data do not include transactions settled in dollars, euros, or yen, e.g., ADR trades in New York and dollar denominated bonds. This is very important in Latin America. Our data set includes all these trades.

Our data set provides perspective on another important dimension of how fund managers address redemptions: they can use 'cash' (e.g., liquid money-market instruments such as US Treasury bills) to buffer their portfolios, allowing them to meet redemptions without selling less-liquid assets. In principle, this can mute the effect of investor outflows on the underlying stocks. However, managers can also reinforce investors' actions if they increase their liquid positions in times of investor retrenchment. For our whole sample, funds kept an average of 4.4% of their net asset value in cash. We then split our sample into two sub-samples, one where on average these funds received inflows, and one where on average these funds suffered outflows. We find that average cash positions are remarkably stable: in the inflows sub-sample we find an average cash position of 4.6%, whereas in the outflow sample we find an average cash position of 4.3%. Managers' choice of cash position does not appear to either mute or reinforce investor actions.[18]

### *4.2. Momentum trading results*

We turn now to the evidence on momentum trading. In our full sample, we find strong evidence of lag-zero momentum trading at both the manager-only and investor-only levels (Table 1, column 1). In every case, lag-zero momentum is positive: managers and investors systematically buy current winners and sell current losers. Interestingly, this contemporaneous momentum trading is especially strong during crises. (Recall that positive lag-zero momentum is not synonymous with positive feedback trading since these trades, while contemporaneous in quarterly data, may not lag returns.) To interpret the size of the coefficients,

[18] A natural question is whether these cash positions are stable because managers face some kind of constraint. The reality is that funds are far less constrained than our cash-holding results might indicate in any de jure sense. De facto, however, managers are sensitive about departing too much from their benchmarks. The classic example is the hapless manager at Fidelity's Magellan Fund in the late 1990s who felt that the stock market was over-valued, switched heavily into cash, watched the market rise further, and was fired for the decision.

consider the manager-only L0M estimate of 1.19. Given the units of our data, an L0M estimate of 1 implies that on average the product of quarterly ($\Delta Q_{i,j,t}/Q_{i,j,t}$) and $R_{j,t}$ is 1% (a representative example would be a return of −10% and a position reduction of 0.10, or 1%).[19]

For lag-one momentum trading, we find significance here as well, but it is concentrated at the manager level.[20] The positive statistic implies that managers systematically buy past winners and sell past losers. This lag-one result does correspond to positive feedback trading. (Grinblatt et al., 1995, also find evidence of lag-one momentum trading in their analysis of the domestic strategies of US mutual funds; because they do not separate the trading of managers from that of investors, it is not clear whether their result also arises primarily due to manager behavior.) Do these results reflect rational behavior? When returns are positively auto-correlated, positive feedback trading can be a profit-maximizing response. This raises the question of whether measured returns within Latin America exhibit positive autocorrelation. (We include the word 'measured' because some causes of positive autocorrelation—such as non-synchronous trading periods, and therefore non-synchronous measured prices—cannot be exploited through momentum trading.) In fact, there is substantial evidence that returns are positively autocorrelated in Latin America (see, e.g., Richards, 1996; Rouwenhorst, 1999; Kaminsky et al., 2000).

It is important to note, however, that while positive autocorrelation is necessary for rationalizing positive lag-one momentum trading,[21] it is certainly not necessary for rationalizing positive lag-zero momentum trading. As noted in Section 2.1, returns and trades may be truly contemporaneous with trades if order flow itself is driving prices. This is possible where fund transactions are 'large' relative to liquidity in the market (the imperfect substitutability channel noted in Footnote 5), or when fund managers' trades are perceived as containing superior information.

Table 2 presents our manager-only measure during three specific crises: the Mexican Crisis (December 1994 to June 1995), the Asian Crisis (July 1997 to March 1998), and the Russian Crisis (August 1998 to December 1998). (We do not include an investor-only measure because that measure is calculated at the fund level so there are too few observations in that case to break the crisis sample

[19]Returns are measured in percent. The quantity-adjustment term in momentum is untransformed (e.g., the 0.25 in the example). Note that the quantity-adjustment term uses the average quantity in the denominator, so that the position reduction in our parenthetical example is only approximate. Note too that our L1M measures below are based on monthly returns, not quarterly returns as in our L0M measures, so their size is correspondingly smaller.

[20]In our estimation, L1M always relates the transacted quantities between $t-1$ and $t$ with the return over the month preceding $t-1$. Increasing the length of the period over which lagged returns are measured diminishes explanatory power, in general. Note too that for robustness, we estimate each cell based only on observations of $M_{i,j,t}$ within three standard deviations of its mean. Using all observations tends to increase both point estimates and $t$-statistics.

[21]It is necessary because trading is costly.

into separate crises.) We find that fund managers systematically bought current winners and sold current losers during all three of these crises (L0M). These point estimates are larger for the Mexican and Russian crises than for the Asian crisis (which may relate to the common view that the Mexican and Russian crises were more liquidity driven than the Asian crisis). We do not find positive feedback trading by managers across all three of these crises, however (L1M): only in the case of the Mexican crisis is the L1M statistic positive and significant. This is perhaps not surprising given that our sample is includes only dedicated Latin America funds.

### *4.3. Contagion trading results*

Tables 3 and 4 present our contagion trading results. Table 3 presents the all-sample results, as well as the crisis versus non-crisis sub-samples. Table 4 splits the crisis sub-sample further into the Mexican, Asian, and Russian crises. Note from Table 3 that we find more significant evidence of contagion trading at the investor level than at the manager level. For investors, all three of the applicable return benchmarks (Asia, Russia, and the US) show evidence of contagion trading, whereas for managers only two of the five applicable benchmarks show evidence of contagion trading.[22] For managers, the strongest contagion trading occurs in response to the Brazilian market: fund managers are strong buyers of other Latin American equities when Brazil's returns are high, and vice versa. For investors, the strongest contagion trading occurs in response to the Russian market, which squares with informal accounts of the extraordinarily intense contagion during the Russian Crisis. Note that the contemporaneous link with US equity returns is negative. This negative L0C statistic for the US return implies that fund investors systematically buy Latin American equities when US returns are low. Though past work has shown clear links between emerging-market returns and US interest rates, this is the first evidence we are aware of that links actual portfolio shifts to US equity returns.

Table 4 focuses on fund managers' contagion trading during three specific crises: the Mexican, the Asian, and the Russian. The reaction of managers to Russian equity returns during the Russian crisis was particularly strong: they systematically sold Latin American equities when Russian equity returns were low. For the Mexican crisis the effect is smaller. For the Asian crisis, there is no discernible link to the trading of Latin American equities. The last three columns show the link to US market returns during each of these three crises. Given the important economic links between the US and Mexico, it is not surprising that the response of Latin-American portfolios and US returns is strongest during the

[22] The lower left-hand cells are not applicable for the investor-only measure because underlying investors can only choose to buy or sell the Latin American fund, they cannot choose to buy or sell the non-Brazil or non-Mexico parts of those funds.

Mexican crisis. Interestingly, the contagion-trading statistic is negative (and significant). This suggests that during the Mexican crisis, managers tended to buy Latin American equities when US returns were low, and vice versa. One interpretation is that low US returns in the face of Mexico's crisis bodes poorly for Mexican equities, which induces a portfolio shift toward the rest of Latin America. The Russian crisis is different. In that period low returns in the US corresponded to contagion selling of Latin American equities (perhaps because the signal had more global significance).

In closing this section on contagion trading, it is worthwhile re-emphasizing the qualitative difference between the results above and most of the existing contagion literature. The difference is that we measure quantities as well as prices, and address their joint behavior, whereas much of the literature focuses on correlation in prices only.[23]

## 5. Conclusion

Discriminating among the various ways that financial markets can spread crisis requires a sharper picture of actual behavior. Who is doing the trading? What are their trading strategies? In this paper we examine portfolios of an important class of international investor—US mutual funds. We address two sets of questions. The first relates to whether and when these funds engage in momentum trading—systematically buying winning stocks and selling losing stocks. We find that international funds do engage in momentum trading. Their trading exhibits positive momentum, due to momentum trading from two sources: fund managers and underlying investors (through redemptions/inflows). Funds engage in momentum trading in both crisis and non-crisis periods. Contemporaneous momentum trading is stronger during crises, and equally strong for managers and investors. Lagged momentum trading is stronger for managers.

The second set of questions we address relates to funds' use of contagion trading strategies—selling assets from one country when asset prices fall in another. We find that funds do engage in contagion trading and this result is robust to controlling for local-market returns, own-stock returns, and US-market returns.

[23] As a test of robustness of our bivariate relations, we also applied a regression-based approach (see, e.g., results included in the appendix of the working paper Kaminsky et al., 2000). Specifically, we regressed the percentage change in share holding of individual stocks—adjusted to conform to the manager and investor measures introduced in Section 2 above—on the (1) own stock return, (2) lagged own stock return, (3) local market return, (4) regional index return, and a US index return. The results are broadly consistent with our bivariate analysis. Specifically, for managers we find significant positive momentum trading at both lag 0 and lag 1. For investors we also find positive lag-0 momentum trading (in this case, positive coefficients on the local return since momentum is not at the stock level). As for contagion trading, the regression results show that investors are much more sensitive to the regional index return than the managers.

Strictly speaking, while these controls have a sound theoretical basis, they are not sufficient to conclude that this contagion trading is non-fundamental (or pure) contagion trading. In any event, we have uncovered several stylized facts that are useful for evaluating hypotheses about the emerging-market crises and their transmission.

Beyond these stylized facts, this paper includes several methodological innovations. For example, the distinction between momentum trading at the manager and investor levels is new to the literature, as is our method for distinguishing the two. Our method of measuring contagion trading via transaction quantities is also new.

An important question we have not addressed is, Who takes the other side of these momentum and contagion trades? Someone certainly must. This question is, unfortunately, beyond the feasible scope of our analysis. We can offer some parting thoughts however. Consider for example the following question: If the model in our managers' and investors' heads is one of undershooting prices, followed by positively autocorrelated returns, then must it be that their counter-parties believe the opposite model? No, this is not necessary. The literature in microstructure finance—which we touch on in Section 2.1—provides many models of liquidity providers who do not have opposite models or views, they simply require compensation for providing liquidity in the form of transaction costs (revenues from their perspective). It is also appropriate to keep in mind that, together, the mutual funds we examine own only about 10% of the market capitalization of the countries we consider (Kaminsky et al., 2001). If they were a more substantial fraction, then finding counter-parties for their trades would be much more difficult. Indeed, the premise that funds respond to contemporaneous returns rather than causing them would be become rather tenuous.

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