On the International Transmission of Shocks: Micro-Evidence from Mutual Fund Portfolios

Claudio Raddatz Sergio L. Schmukler*

March 1, 2012

Abstract

This paper uses micro-level data on mutual funds from different financial centers investing in equity and bonds to study how investors and managers behave and transmit shocks across countries. The paper finds that the volatility of mutual fund investments is driven quantitatively by both the underlying investors and fund managers through (i) injections/redemptions into each fund and (ii) managerial changes in country weights and cash. Both investors and managers respond to country returns and crises and adjust their investments substantially, for example, generating large reallocations during the global crisis. Their behavior tends to be pro-cyclical, reducing their exposure to countries during bad times and increasing it when conditions improve. Managers actively change country weights over time, although there is significant short-run pass-through from returns to these weights. Consequently, capital flows from mutual funds do not seem to have a stabilizing role and expose countries in their portfolios to foreign shocks.

JEL Classification Codes: F32, F36, G11, G15, G23

Keywords: capital flows, contagion, crises, global financial crisis, injections/redemptions, international investment, mutual fund investors, mutual fund managers, portfolio management

---

* This paper was part of the MIT Sloan School of Management-NBER project on the global financial crisis. We thank Charles Engel, Kristin Forbes, Jeff Frankel (the Editor), Luis Servén, Jeremy Stein, two anonymous referees, and participants at the AEA Annual Meeting (Chicago, IL), the LACEA-LAMES Annual Meeting (Santiago, Chile), the MIT-NBER conference (Bretton Woods, NH), and the NIPFP-DEA Workshop on Capital Flows (Delhi, India) for very useful comments. We are grateful to Tomas Williams for truly outstanding research assistance and for computing most of the estimates for this paper. Francisco Ceballos, Ana Gazmuri, Laura Malatini, and Lucas Núñez also did an excellent job as research assistants, helping us at different stages of the paper. We are indebted to EPFR Global for giving us unique data that made this paper possible. We thank the World Bank Development Economics Department and Knowledge for Change Program for generous research support. The views expressed here do not necessarily represent those of the World Bank. Authors are with the World Bank, Development Research Group. Email addresses: craddatz@worldbank.org and sschmukler@worldbank.org.

1. Introduction

The global financial crisis of 2008 reignited the interest in the behavior of financial intermediaries in both propelling risk taking and propagating shocks across markets and countries. In fact, several papers argue that financial intermediaries were at the core of the global financial crisis, as well as some of the previous crises in emerging economies. In particular, the international finance and finance literature stresses that market participants tend to take too much risk during good times, and run and retrench when shocks hit the financial system.[1] Countries and companies can then become financially constrained as liquidity in the financial system dries up.

In a world where most savings are intermediated, two types of market participants become essential to understand the behavior of financial institutions: (i) the underlying investors delegating their assets to financial intermediaries and (ii) the managers allocating those assets. In the case of investments abroad, investors tend to channel the bulk of their assets through financial intermediaries dedicated to investing across countries, pouring funds into those institutions when they wish to diversify globally and withdrawing their funds when they favor local assets. Managers, in turn, need to deal with these shocks from investors as well as other shocks by deciding how much cash to accumulate and in which countries to invest. The shocks managers face can be large. For example, during the 1998 Russian crisis and the 2008 global crisis, financial institutions faced severe liquidity shortages and withdrawals from the investors, leading to the collapse of Long-Term Management Company (LTCM), Bear Stearns, and Lehman Brothers, and pushing the world financial system to the brink of a meltdown.

The link between the underlying investors and fund managers, partly driven by limited information and principal-agent problems, is important because it can profoundly affect portfolio allocations by financial institutions. This link exists because managers are monitored by investors (and their own supervisors) and respond to the incentives that this monitoring imposes on them. The relation between managers and investors is perhaps more obvious in the case of demandable (redeemable) debt that affects banks and bond mutual funds (among others), where short-term rollover decisions by investors are strategic complements and condition

[1] See Allen and Gale (2000, 2007), Chang and Velasco (2001), Cifuentes et al. (2005), Diamond and Rajan (2005), Rajan (2005), Calomiris (2008), Broner et al. (2010, 2011), Milesi-Ferretti and Tille (2010), Forbes and Warnock (2011), and Gourinchas and Obstfeld (2011), among many others.

managers that are involved in maturity transformation.[2] Bank runs are a good example of this because the incentives to run are correlated among depositors, given that their demandable claims (whose value is fixed in nominal terms) are returned on a first-come-first-served basis (Diamond and Dybvig, 1983).[3] Although the rush to get out first is attenuated for demandable equity (where the value of the claim moves in tandem with the value of the asset), fragility can exist even in this case. For instance, if investors have asymmetric information and flows to mutual funds are related to past returns, sudden price collapses can generate fire sales by investors (Shleifer and Vishny, 1997, 2011), which accentuate the price declines and provoke further liquidations. This serial correlation of returns due to funds selling assets at distressed prices provides incentives for investors to sell their claims as soon as possible and may result in run-like behavior.

The fact that investors can pull out their demandable (debt or equity) claims can generate incentives for managers to avoid long-run arbitrage opportunities, herd, and deviate from the optimal portfolios for the underlying investors (Scharfstein and Stein, 1990 and Stein, 2005, 2009). For example, in the case of mutual funds, open-end structures allow investors to monitor managers on a short-term basis and discipline them if they behave badly, but this short-run monitoring may constrain managers to take long-run positions. Namely, managers might not buy assets during crises that are likely to pay off in the long run because they can suffer short-term withdrawals from the underlying investors. Agency problems might thus lead to short-term structures, vulnerability, fire sales by investors and managers, and contagion.

While the literature argues that the supply side of funds and, in particular, the actions of managers and investors are important in the transmission of shocks, detailed and direct evidence on how financial intermediaries behave in their international investments is rather limited. Some papers analyze the case of bank flows, whereas others study mutual fund flows across countries.[4] Although informative about the behavior of institutional investors, these studies tend to focus on aggregate capital flows into different countries. Therefore, they miss

[2] More specifically, when one investor withdraws financing, banks and bond mutual funds are more likely to run into trouble. Therefore, other things equal, other investors have more incentives to withdraw financing as well. The decisions by investors are strategic complements (Bulow et al., 1985).

[3] The maturity mismatch and the possibility of a run constitute a source of fragility as liquidity may suddenly vanish (Brunnermeier, 2009; Shin, 2009; Raddatz, 2010; and Gorton and Metrick, 2011). Vulnerability can be exacerbated under the presence of leverage, where margin calls can also trigger collapses. See, for example, Calvo (2002), Kodres and Pritsker (2002), Mendoza and Smith (2006), and Mendoza (2010).

[4] See, for example, Borensztein and Gelos (2003), Martinez Peria et al. (2005), Broner et al. (2006), Hau and Rey (2006), Cetorelli and Goldberg (2011), and Fratzscher (2011).

important micro aspects of the inner-workings of financial institutions that are essential to understand how financial intermediaries invest, react to shocks, and transmit crises.

One paper that stands out in the recent literature and is closely linked to our paper is Jotikasthira et al. (2012). Using a database similar to ours, they show that movements in investor flows force significant reallocations in equity fund portfolios related to emerging markets, which in turn affect equity returns, correlations among emerging markets, and the developed market betas of emerging markets. Two other earlier exceptions that are also good complements to our paper are Kaminsky et al. (2004) and Hau and Rey (2008). Kaminsky et al. (2004) study momentum trading by investors and managers. Hau and Rey (2008) use data on equity funds to analyze whether foreign exchange and equity risk measures trigger rebalancing behavior at the fund and stock level.[5]

In this paper, we use a micro-level dataset on international mutual funds to shed new light on how investors and managers react to shocks and crises (in particular the 2008 global financial crisis), and help transmit them across developed and emerging countries. International mutual funds are especially useful because they enable us to analyze separately: (i) injections/redemptions driven by the underlying investors; (ii) actual portfolios across countries that are allocated and rebalanced at the sole discretion of managers (and do not need to be inferred from other data); (iii) their interactions (how investors monitor managers); and (iv) the relative contribution of investors and managers to capital flows.[6] The main data consist of portfolio weights and assets invested in each country around the world for 1,076 equity and bond mutual funds on a monthly basis during 15 years, from January 1996 to November 2010. The data cover portfolio allocations to 124 developed and emerging countries and cash, plus fund returns that allow us to obtain injections and redemptions into each fund.

We explore several questions of interest. How volatile is the mutual fund investment across countries? Do mutual funds help transmit crises, as the literature has argued for financial intermediaries? What was their specific behavior during the global crisis? More generally, what is the role of investors and managers? How volatile are injections? To what degree do weights remain constant over time? To the extent that weights change, how much

[5] A much larger finance literature studies other aspects of the behavior of mutual funds at the domestic and international levels. See, for example, Grinblatt et al. (1995), Wermers (1999), and Gompers and Metrick (2001) for U.S. domestic funds, and Kang and Stulz (1997), Dahlquist and Robertsson (2001), Kim and Wei (2002), Chan et al. (2005), Gelos and Wei (2005), and Didier et al. (2010) for international funds.

[6] Henceforth, we sometimes use the term "injections" to refer to both injections and redemptions (negative injections).

are they the cause of valuation effects versus actual buying/selling in different countries or regions? How long does it take for weights to adjust to shocks? How are cash positions used? Are there differences between bond and equity funds? Are capital flows and retrenchments largely driven by inflows into and out of investment funds by the underlying investors that lead managers to liquidate positions across countries to maintain portfolio weights, or by active changes in these country weights by fund managers?

The main results of the paper can be summarized as follows. Mutual fund assets fluctuate substantially and pro-cyclically over time. Both the underlying investors and managers are behind these movements, retrenching from countries in bad times and investing more in good times. In the case of the underlying investors, fund performance and wealth effects (driven by shocks at home) seem to have a direct impact on how much they invest in international mutual funds. When shocks are correlated across countries, like during the global crisis, they do not act as deep-pocket international investors buying assets abroad at fire-sale prices. The investor behavior exerts pressure on managers, who need to react to this pressure as well as to shocks to returns (or valuation effects). In the short run, managers allow shocks to returns to pass through to country weights, with the latter changing substantially over time. Over the long run, weights deviate from the pass-through effects. While during normal times managers do not allow the pass-through to be complete (in relative terms, they reallocate a small fraction to countries that are doing badly), they behave pro-cyclically during crises, moving away from countries in turmoil. This pro-cyclicality is observed particularly in equity funds. The behavior of both managers and investors has a direct effect on capital flows to countries around the world. In sum, neither managers nor investors are contrarian, especially during crises, and their behavior seems to amplify crises and transmit shocks across countries.

Our results show some notable differences between the behavior of equity funds and bond funds. Because the latter have been much less analyzed in the literature of international mutual funds, documenting these differences is by itself a novel aspect of this paper. Among bond funds, the volatility of injections explains most of the overall variability in asset growth, while in the case of equity funds the variability in asset growth is almost equally divided between fluctuations in returns and injections. Moreover, underlying investors in bond funds withdraw more money in response to country-specific and global crises than those investing in equity funds. Furthermore, bond fund managers allow a much smaller pass-through from returns to portfolio weights than equity fund managers, so bond funds seem to behave in a

relatively more contrarian way than equity funds. This behavior may result from a lack of ability to quickly liquidate bonds of countries suffering strong reversals. Consistent with this, bond funds hold, on average, more cash than equity funds, which makes them better able to respond to injections/redemptions through variations in cash instead of relocating money across countries. In fact, bond fund managers use cash in a pro-cyclical manner, reducing their cash holdings in bad times and increasing them in good times. In contrast, equity fund managers use cash counter-cyclically.

Our findings are relevant to different strands of the theoretical literature in both international finance and finance. First, the results in this paper suggest that the fact that assets are demandable plays an important role in the reactions of investors, and is a factor that cannot be neglected in future models of crises. We show that investors run even from equity claims, not just from debt claims. This could be explained, for example, by autocorrelation in returns or wealth effects at the investors' home country. Moreover, a run by certain investors might trigger runs by other investors, perhaps because of asymmetric information or because flows are related to past returns.

Second, the findings in this paper also contribute and provide evidence to the theoretical literature that discusses whether the open-end structure of mutual funds matters. Our results from open-end funds indicate that when shocks are correlated across countries, managers do not act as deep-pocket international investors buying assets abroad at fire-sale prices. The behavior of investors exerts additional pressure on managers. The evidence is, thus, consistent with the theoretical literature that argues that in open-end structures neither managers nor investors act counter-cyclically, trying to benefit from potential long-term arbitrage opportunities and thus performing a stabilizing role. This behavior is also consistent with the contagion literature.[7] The global crisis was a clear example of this type of behavior.

Third, our findings also relate to the literature that discusses how different types of shocks trigger crises. There is an extensive literature on the origins and propagation of financial crises, and a growing literature on the global financial crisis that tries to understand why a relatively small shock in the U.S. subprime sector resulted in a global recession and the near collapse of many financial institutions and markets. Several papers in this literature conclude that financial institutions play an important channel in the transmission of shocks

[7] See, among many others, Kaminsky and Reinhart (2000), Claessens and Forbes (2001), Boyer et al. (2006), and Mendoza and Quadrini (2010).

across countries, producing large fluctuations in capital flows.[8] In this paper, we show micro-evidence that suggests that shocks to the supply side of funds seem important in the transmission and amplification of shocks. We are able to measure different effects inside financial intermediaries, which other papers that focus on aggregate capital flows (even by type) cannot do. In particular, we disentangle the actions of investors injecting and withdrawing capital from open-end funds, possibly as a way to discipline managers, and the behavior of managers actively allocating country portfolios and reacting to shocks from investors and returns. Our results support the claims that shocks to financial institutions and their inner-workings are important to understand crises.

Fourth, there is an increasing interest in studying how portfolios are managed when investing around the world and how shocks impact them. Important among the shocks are valuation effects.[9] One advantage of using mutual fund data is that we can work with actual portfolios. This is helpful because, while there is much discussion on portfolio reallocations, there is limited information on how portfolios are allocated and managed. There are no data on the portfolios of households and little data on those of other institutions like banks and hedge funds. Moreover, unlike country portfolios, the data we use are not inferred from capital flow data. In our case, we link movements in asset allocations to capital flows by an important group of foreign portfolio investors (international mutual funds). Moreover, we analyze in detail what role valuation effects play in changes in portfolio compositions.

The rest of the paper is organized as follows. Section 2 briefly describes the data and provides some basic statistics on mutual fund holdings. Section 3 discusses the shocks to managers and studies the variation in fund allocations (the manager's decisions). Section 4 analyzes how managers and investors react to crises. Section 5 studies how the variations in the investor and manager responses affect capital flows to different countries. Section 6 concludes.

2. Data and Summary Statistics

In this paper, we use a micro-level dataset consisting of an unbalanced panel of 1,140 international equity mutual funds and 121 international bond funds, containing the monthly country portfolios of these funds over the period January 1996 to November 2010 for equity funds and July 2002 to November 2010 for bond funds. The dataset comes from EPFR Global

[8] See, for example, Shiller (2008), Eichengreen et al. (2009), Hellwig (2009), and Mishkin (2011).
[9] See, for example, Broner et al. (2006), Gourinchas and Rey (2007a), Hau and Rey (2008), Krugman (2008), Devereux and Yetman (2010), and Gourinchas et al. (2010).

and includes active and dead cross-regional and regional equity and bond funds registered in various domiciles globally. These funds invest in over 124 developed and developing countries around the world. For each fund and month, the dataset contains the total net asset (TNA) value of the fund denominated in U.S. dollars, the percentage of fund assets allocated to each country (which we call *country weights* or *weights* and are non-negative), and the percentage held in cash. The dataset has both actively and passively managed funds with different investment scopes: global, emerging markets, and different regional funds (Table 1). The data also contain information on the fund domicile, the family (investment or asset management company), and main currency denomination.[10] We generally use the term "fund type" to refer to any of these dimensions of fund characteristics, clarifying the precise dimension when necessary.

To perform the empirical analyses, we cleaned the original data in standard ways, reducing the sample in about 15% and the total of funds to 1,076.[11] The final dataset on country allocations contains 7,429,000 observations on the investments of the included mutual funds across countries and time. There is substantially more data (cross sectional and time series) and variety of funds for equity funds than for bond funds.[12]

We complement the analysis by collecting additional data from other sources to compute inflows and outflows to funds and countries. To calculate monthly injections into each fund, we collect data on fund prices (Net Asset Values, NAVs) from Bloomberg and Datastream (DS) that we match to the corresponding funds from EPFR Global by name and family. We are able to match about 90% of the funds in our cleaned sample, ending up with 896 and 106 equity and bond funds, respectively, with return data.[13] The analyses in the paper that require fund-return information are restricted to this subset of funds.

---

[10] Our sample covers mainly open-end mutual funds. While EPFR Global data contain some closed-end funds, their importance is relatively small. Moreover, many of the closed-end funds they cover allow for monthly or quarterly subscriptions and redemptions, and are therefore not truly closed.

[11] We conducted two basic cleanings. First, we removed fund-time periods where the data was reported at a frequency other than monthly. This excludes some funds that report quarterly data during part of the sample period. Second, we excluded funds that report data for less than 12 months in the entire sample (unless they are present until the end of the sample period).

[12] Equity mutual funds contain nine types of funds (of global and regional nature). There are a total of 965 mutual funds with 6,867,500 usable observations. Instead, bond mutual funds encompass two types of funds (global and global emerging markets), and include a total of 111 mutual funds. The total number of observations (country weights and cash) for bond funds is 561,500.

[13] Information on ISIN is not available for the EPFR Global mutual funds, so we match the return data with the EPFR Global data according to the mutual fund name and family, using an algorithm that compares the (Levenshtein) distance across names. We then manually screen out incorrect matches and complete the matching process. The total number of fund price observations is 255,510.

Because we do not know the detailed portfolio of each fund within a country, we use country-level indexes to compute returns and assume throughout the paper that all funds investing in a country experience the same return to their investments in that country, disregarding country-return heterogeneity across funds.[14] To this end we collect monthly, dividend-adjusted price indexes in U.S. dollars for stock markets (MSCI Standard Index, S&P Broad Market Index, and local sources for a total of 86 countries) and bond markets (JP Morgan sovereign bond index for 78 countries) in which mutual funds invest.[15] Analyses that require country-return information are restricted to those countries and time periods for which we could gather these data.

Table 1 shows the characteristics of the cleaned mutual fund sample (without constraining by return price availability). Panel A reports sample characteristics for equity/bond funds. There are 965 equity funds (85% of the original sample) with a median number of 47 observations per fund. The total number of bond funds is 111 (92% of the original sample) with a median number of 34 observations per fund. Panel B reports the number of funds and observations by different partitions. Of the total sample, 95% is actively managed and the rest passively managed. Also, almost 65% of the funds have their investment scope in Asia (excluding Japan), global markets, global emerging markets, or Europe. Moreover, Table 1 documents the number of funds and observations by domicile. The funds are primarily domiciled in developed market jurisdictions, in fact, 80% of the funds are domiciled (in order of importance by the number of funds) in Luxembourg, the U.S., the U.K., and Ireland.[16] Average total net assets (first computed within fund and then across all funds) is around 620 million U.S. dollars for both equity and bond funds.

Figure 1 shows the evolution of total net assets (TNAs) in all equity and bond funds by region. Panel A plots total assets for equity funds between January 1996 and December 2000 and between June 2001 and November 2010.[17] Panel B displays total assets for bond funds

[14] We believe this is a reasonable approximation given the documented synchronicity of returns across assets within countries, especially in developing countries (Morck et al., 2000). Furthermore, we find a strong correlation between the return of a fund computed directly from its NAV and the return computed from the portfolio of country investments and country-level returns, which provides additional validity to our approximation.

[15] Time coverage is January 1999-November 2010 for stock market indexes and July 2002-November 2010 for bond market indexes. The total number of observations of stock and bond market indexes across countries and over time is 23,272.

[16] Interested readers are referred to the working paper version of this paper, Raddatz and Schmukler (2011), for a classification of funds by mutual fund family and a more detailed description of the data.

[17] This time split is important due to the relevance of global equity funds. EPFR Global starts reporting information for global equity funds in June 2001. The introduction of this type of funds adds nearly 90,000 million U.S. dollars to the total assets of all equity funds.

between July 2002 and November 2010. The figure shows not only the large increase in total assets over time, but also the sharp declines around crises, particularly around the Asian and Russian crises and the global financial crisis. A similar pattern is observed for bond funds. The figure also shows that, as a group, bond funds are much smaller than equity funds (100 versus 599 billion U.S. dollars in November 2010), even though the mean fund is of a similar size.

It is interesting to observe not only the variation in TNAs but also that of country weights, for which we focus on the period around the global financial crisis. Figures 2 and 3 show the weights for equity and bond funds, respectively, with global funds at the top and global emerging funds at the bottom. The figures illustrate the evolution of weights for some of the main regions of investment within emerging and developed countries. In particular, they show the weights in: (i) emerging economies (emerging Asia, emerging Europe, and Latin America), developed Europe, and North America for global funds and (ii) emerging Asia, emerging Europe, and Latin America for global emerging funds. The figures also mark some of the main events around the global crisis: the nationalization of Northern Rock, the collapses of Bear Stearns and Lehman Brothers, and the near collapse of AIG.

Figures 2 and 3 show several noteworthy features of the data. First, weights fluctuate substantially over time. Second, there are significant reallocations across regions, especially at times of stress. For example, the figures for equity funds show that, even though the epicenter of the crisis was in the U.S., managers started liquidating their exposure to emerging economies after the collapse of Bears Stearns while they increased their exposure to North America. This is consistent with a relatively smaller collapse in some asset prices in the U.S. than, for instance, in emerging Asia. Only in early 2009 managers started reversing that trend. Among global emerging funds, managers sold their positions in emerging Europe and Latin America and moved to emerging Asia. For example, between June 2008 and July 2009 the mutual fund exposure in Asia increased from 45% to 55%, while it decreased from 14% to 9% in emerging Europe (after having dropped to 7%) and from 24% to 21% in Latin America. Among bond funds, the large substitution took place between developed Europe and North America in global funds, when managers reduced their exposure to Europe from 51% in March 2008 to 31% in November 2008 and increased their share in North America from 7% to 19% during the same period. Global emerging funds sold their positions in emerging Europe and bought assets in emerging Asia after August 2008.

Figure 4 shows a similar plot but for cash positions, which increased for equity funds in the buildup to the crisis and started declining sometime after the collapse of Lehman Brothers. Bond funds show more variation in their cash positions before the crisis, with global bond funds reducing their holdings and global emerging bond funds increasing them. Nonetheless, bond funds quickly reduced their cash positions after the collapse of Lehman Brothers.

3. Shocks to Managers and Portfolio Reallocations

Mutual fund managers decide on the allocation of the funds they manage, but the size of these funds depends on the returns of their previous investments and the injection (redemption) of flows into (out of) the fund. While the return of a fund depends on its past investments, the exact realization of the return is stochastic and can be considered as a shock to the fund manager. Similarly, while the performance of a fund may affect its injections and redemptions, ex-post these inflows and outflows are at the discretion of the underlying investors and largely outside the control of managers.

Mutual fund assets fluctuate importantly. The median growth rate of assets across equity funds fluctuates between -30% and 20%, with an average of 0.35% and a standard deviation of 7.44% over time (Figure 5). Fluctuations in the median growth rate of assets are somewhat smaller among bond funds, between -20% and 10% (average and standard deviation of 1.09% and 3.70% over time, respectively). Table 2 shows interesting variation in the growth rate of assets of funds specialized in different regions/segments. Among equity funds, those specialized in the group called Emerging Europe, Middle East, and Africa and in the one called Emerging Europe experience the highest growth in assets and the highest growth variability. On the contrary, funds specialized in Europe experience the lowest growth rate of assets. Similarly, among bond funds the highest growth rates (and highest standard deviations) occur for global emerging funds. Thus, at the total net assets level, the data show a shift in favor of developing countries during the period analyzed. There are lengthy periods of expansion of assets followed by shorter periods of sharp contractions that roughly coincide with periods of international financial turmoil. For instance, equity fund assets experienced large declines in 1997-1998, 2001, and 2008. Due to sample restrictions, among bond funds we only observe the drop in assets in 2008.

Fund assets may grow because of higher returns of their investments or because of injections to the fund by the underlying investors. In fact, the growth rate of fund i's total assets, $\hat{A}_{it}$, can be trivially written as

$$\hat{A}_{it} = r_{it} + f_{it}, \tag{1}$$

where r_{it} is the (net) return to fund i at time t, and $f_{it} = F_{it}/A_{it-1}$ is the injection to the fund (F_{it}) expressed as a fraction of the fund's initial assets (A_{it-1}). While injections are not directly observable, we can estimate them. To do so, we compute individual fund returns on a given month using data from Bloomberg and Datastream and obtain injections from the difference between the change in total net assets and individual returns. More formally,

$$F_{it} = A_{it} - A_{it-1}R_{it}, \tag{2}$$

where R_{it} is the gross rate of returns to fund i at time t, computed as P_{it}/P_{it-1}, with P_{it} being the fund price or net asset value (NAV), adjusted by dividend payments.[18]

The evolution of returns and injections for the median fund is shown in Figure 5, Panels B and C, and summary statistics are reported in Table 2. For the median equity and bond funds, both returns and injections experience significant fluctuations. For equity funds fluctuations in fund returns are much more volatile than those in injections (standard deviation of 6.23% and 2.05%, respectively), while for bond funds the volatility of these components is similar (standard deviations of 2.53% and 2.05%, respectively). This is consistent with equity returns being more volatile than those of fixed income securities (Schwert, 1989; Andersen et al., 2007). Both components also exhibit a similar time pattern, which also coincides with that of the growth rate of assets, suggesting that the components do not cancel each other, but instead reinforce themselves. Both returns and injections expand during good times and experience severe contractions during periods of financial turmoil. Across types of funds by target region, the most salient pattern is the large growth in injections to funds specialized in BRICs.

The relative variability of returns and injections for equity and bond funds can also be used to explain the variance of the growth rates of assets within funds. Among equity funds, the

[18] A fund's net asset value (NAV) corresponds to the total net assets (A_{it}) divided by the number of shares (N_{it}). Thus, the ratio of NAV in two consecutive periods correspond to the ratio of the total asset values times the inverse ratio of total shares $NAV_{it}/NAV_{it-1} = (A_{it}N_{it-1})/(A_{it-1}N_{it})$. The flows into the fund can also be expressed as the increase (decrease) in shares times the value of the share $F_{it} = (N_{it} - N_{it-1})A_{it-1}R_{it}/N_{it-1}$. Replacing this in Equation (2), we obtain that the gross returns correspond to the ratio of net asset values. The only caveat to our calculation is that total net assets discount the value of a fund's liabilities, such as the fees paid to the managers. However, if these fees are proportional to the assets under management they would only bias the levels of the variables but cancel out when computing the returns and flows relative to initial assets.

variances of returns and injections explain roughly the same fraction of the variability of the growth rate of assets (Table 2, Panel A). On average, the variances of returns and injections explain, respectively, 47% and 53% of fund asset growth variability.[19] Among bond funds, however, the volatility of injections is behind most of the overall variability in asset growth, explaining 89% of the variance. Returns variation explains only 11% of these fluctuations. Among both equity and bond funds, the pattern observed for different fund types is similar to that documented for all funds. These results show that price fluctuations are important drivers of the variation of the gross asset positions of investors, especially in equity, which is consistent with valuation effects having potentially important consequences for movements in net foreign asset positions too (Gourinchas and Rey, 2007b).

The variance decompositions reported above consider the whole period with available data. However, it is possible that the relative contributions of returns and injections vary between tranquil and crisis periods. Table 3 shows that return variability plays a much more important role during crisis times. For instance, the contribution of return variability to the overall variance of equity funds rises to 67% during the global crisis, compared to 37% in the four years leading to the beginning of the crisis. Table 3, Panel B also shows that among bond funds, the contribution of returns variability increases from 12% in tranquil times to 19% during crisis times. These broad patterns are relatively stable across fund types and crises.

The previous results show that, at the fund level, both returns and injections contribute to the variability of asset growth. They also show that returns and injections vary over time in a manner that is consistent with the international business cycle. As said above, both returns and injections show sharp drops during times of financial turmoil, and lengthy expansions during tranquil times. It is therefore possible that the ability of returns and injections to explain variations in assets comes mainly from all these series sharing a common time component. But this is not the case, especially for injections. While a common time component can explain 59% and 20% of the variability of fund returns (for equity and bond funds, respectively), the same component explains only 5% and 9% of the variability of injections.[20]

[19] Following Klenow and Rodriguez-Clare (2005), we equally impute the covariance term to each component (returns and injections). That is, the share of the variance of the growth of assets explained by returns equals the ratio of the variance of returns plus the covariance between returns and injections to the variance of the growth of assets. The contemporaneous covariance between returns and injections is small and negative.

[20] These figures correspond to the overall R^2 of an OLS regression between each of these variables and a set of month fixed effects.

A fund manager's main decision is how to allocate his available funds across the different assets where he may invest, in particular across the countries where the fund specializes. This decision may be driven by long-run structural factors behind the fund's strategic asset allocation (such as, expected returns, covariance of assets across countries, and benchmarks), but it may also depend on short-run variations in these or other factors. Faced with shocks to the return of their investments or to the injections by the underlying investors, fund managers may or may not decide to reallocate their investments within and across countries. But as shown in Figures 2 and 3 portfolio shares fluctuate significantly over time, even at the regional level. This is important because weights that are relatively stable imply that only fluctuations in fund assets (either because of returns or injections) will impact capital flows. On the other hand, country weights that experience non-trivial fluctuations over time indicate that manager decisions, on how to let weights adjust to relative price changes or how to buy and sell assets differentially in different countries, play a significant role in international capital flows.[21]

4. Behavior of Investors and Managers

While the evidence above shows that both the underlying investors and managers change their positions over time, it tells us little about the ultimate determinants of mutual fund investments across countries. For instance, it does not show us how investors and managers respond to crises and shocks. These responses are crucial to understand whether mutual funds contribute to or dampen the transmission of crises across countries. To advance in our understanding of their behavior, we model how injections and weights vary over time using some parsimonious models that, nonetheless, capture basic and important properties of the data.

Underlying investors may link their injections into a fund to attributes that vary at the fund level and over time. Therefore, to study the behavior of injections we regress them on variables measuring the occurrence of crises (both at the countries of destiny of a fund and at the global level), returns of the fund, and returns of its country of origin. This allows us to test if investors inject more resources into a fund when it is performing well, as previously shown for U.S. mutual funds by Chevalier and Ellison (1997), among others. It also permits us to estimate how investors react to changes in the conditions experienced by the countries in which

[21] For interested readers, the working paper version of this paper shows that country weights indeed fluctuate significantly across funds and over time.

funds invest, measured by crisis at the country of destiny. Furthermore, investors are also affected by shocks such as global crises and changes in the conditions at their country of origin, which can lead to change their investments. For example, investors may feel richer and desire to invest more internationally during good times. But it could also be the case that investors prefer to invest more internationally when conditions in their home countries worsen, because international markets might provide better prospects in relative terms. Ex-ante, all these effects are not obvious. Investors may react to different types of shocks pro-cyclically, counter-cyclically, or not react at all.

We sequentially regress the injections to a fund on a weighted country crisis dummy, a dummy variable taking the value one during periods of global turmoil, lagged fund returns, and the returns of the fund's country of origin.[22,23] This is akin to an augmented version of the specification estimated by Sirri and Tufano (1998) for U.S. mutual funds.[24] In addition, the regressions include, alternatively, fixed effects at the fund, month, and country of origin-month levels. Standard errors are clustered at the country of origin-month level to control for correlation in injections to funds located in the same country.[25]

The results reported in Table 4 show that injections to both equity and bond funds fall when the countries of destiny are affected by crises (Column (1)) and in periods of global crises (Column (2)). On the contrary, injections increase in response to the lagged returns of the fund (Column (3)), which are observable by the underlying investors, and in response to increases in the contemporaneous returns in the country of origin of the fund (Column (4)), which capture local conditions. Interestingly, among both equity and bond funds, the coefficient on lagged fund returns is lower than that for country of origin returns. We can interpret this difference as suggesting that wealth effects are stronger than substitution effects (across funds). A decline in

[22] In the regressions, we normalize the injections to a fund (given by Equation (2)) by the average assets instead of the initial assets to isolate fluctuations in injections from fluctuations in initial assets. Results using injections normalized by initial assets (available upon request) are qualitatively and quantitatively similar to those reported here, but estimators are less precise because of the additional volatility of the denominator in the expression.

[23] The weighted country crisis dummy is constructed using yearly country crisis data, weighted by the fund's country portfolio weights at the beginning of the year. The crisis variable comes from Broner et al. (2010) and dates a crisis the years when a country suffers at least a banking, debt, or currency crisis, according to indicators widely used by the literature. The periods of global turmoil are: July 1997-December 1997 (the Asian crisis), August 1998-December 1998 (the Russian crisis), March 2001-December 2001 (the dotcom bust, September 11, and the Enron scandal), and September 2008-June 2009 (the global financial crisis). Fund returns are computed from fund-price data. Returns of the fund's country of origin are measured using a broad equity price index from the country where the fund is located. Funds that are domiciled in Luxembourg are matched with country returns from Belgium because there are no available indexes for bonds and equity from Luxembourg.

[24] Sirri and Tufano (1998) include a longer set of lags of injections and fund returns in their specification. We also estimated a version including up to three lags of both variables obtaining similar results.

[25] Clustering estimations by month yields very similar results to using clusters by country of origin-month.

local conditions does not itself lead investors to increase their investments in international funds to take advantage of equity return differentials or "carry-trade" effects (in cases when these declines are associated with low interest rates). Nonetheless, controlling for the conditions in the country of origin, more money flows into (or less money gets out of) the best performing funds.

The regression in Table 4, Column (5) includes all the previous variables simultaneously and shows similar coefficients than those obtained in the single-variable regressions, except for the impact of country crisis on equity funds. This indicates that while in some cases the country-crisis variable is capturing the variation coming from periods of global turmoil, the potential correlation between global crises and returns at the fund and country level is not behind the significant results obtained in the previous columns.

Quantitatively, a global crisis reduces injections to equity funds by about 1 percentage point. This is much larger than the average monthly injection of about 0.1 percentage points, and 20% of the interquartile range of variation of injections over average assets (5 percentage points). Similarly, a 10% decline in fund returns also reduces injections by 1 percentage point. Because crises and fund returns are negatively correlated, the joint impact of crises is larger. Moreover, a 10% decline in the returns of the country of origin (domicile) of the fund reduces injections by 2 percentage points. The quantitative importance of these variables for bond funds is higher. For instance, a global crisis reduces injections to bond funds by 3 percentage points. Although the average injection over average assets for these funds is also higher (1.3% instead of 0.1% for equity funds) the interquartile range of variation is similar than in equity funds (5%). Thus, because of greater coefficients, injections to bond funds react more strongly to returns and crises in the target countries and the country of origin.

The regressions in Table 4, Columns (6) and (7) add time (month) and country of origin-time fixed effects to the regression in Column (5), respectively. In both cases, and among equity and bond funds, the impact of country crisis declines and becomes statistically insignificant (the global crisis variable is dropped from the regression in both cases because it varies only over time). This confirms that the identification of the coefficient in Column (1) comes mainly from a common, time-varying component, and not from the idiosyncratic incidence of crises in individual countries. Lagged fund returns and country returns remain statistically significant, except when including country of origin-month fixed effects for bond

funds, where the coefficient for these returns retains the magnitude but becomes marginally significant (with a p-value of 0.11).

The results above show that the underlying investors respond to local and international conditions when deciding whether to inject or withdraw money to/from mutual funds. On the other hand, fund managers must choose how to allocate or liquidate positions in response to these injections/redemptions and the realized returns of their investments. It is this response (or lack thereof) that ultimately determines the net inflows/outflows to the countries where each fund invests.

To empirically study the behavior of fund managers, we start with the following identity that relates the country portfolio weights of a fund in two subsequent periods

$$w_{ijt} = w_{ijt-1}\frac{\left(R_{ijt} + f_{ijt}\right)}{\left(R_{it} + f_{it}\right)}, \tag{3}$$

where w_{ijt} is the portfolio weight of fund i in country j at time t, R_{ijt} and R_{it} are the gross returns of the investments of the fund in country j and across its whole portfolio, respectively. f_{ijt} is the net flow of money from fund i to country j at time t, expressed as a fraction of the fund's initial assets in the country A_{ijt-1}, and f_{it} is the injection/redemption of funds into (out of) fund i by its underlying investors, expressed as a fraction of the initial assets of the fund A_{it-1}.[26]

The expression in Equation (3) simply states that the weight of a country in a fund portfolio at the end of time t depends on the country's initial portfolio weight, the return of the fund's investments in that country, the return of the whole fund portfolio, the fund's new net inflows into and out of the country, and the fund's injections/redemptions. Intuitively, in absence of any type of flows (by the fund across countries or to the fund), the portfolio weight of a country would increase (decrease) only if the country assets have a higher (lower) return than those of other countries in the fund portfolio. Henceforth, we refer to the counterfactual country portfolio weight in absence of any new flows or injections, $w_{ijt}R_{jt}/R_{it}$ as the *buy-and-hold weight*. The presence of injections adds another layer of variation in relative weights because they would require the fund to allocate new money across countries or to liquidate positions that may result in changes in portfolio weights. Furthermore, the flows to different countries do not need to be linked to injections; even in the absence of the latter, managers

[26] As explained in Section 2, for data availability reasons we assume that the returns of all funds i investing in country j are identical; namely, $R_{ijt} = R_{jt}$ across funds.

might decide to change country weights by reallocating positions across countries. While Equation (3) is an identity, it does not imply any specific behavior for country portfolio weights at time t because funds have the liberty, in principle, to relocate funds across countries as they see fit (through variations in f_{ijt}) to achieve a given portfolio composition.

The discussion above shows that Equation (3) is a useful starting point to analyze the behavior of portfolio weights. Log-linearizing that equation around a state with gross returns equal to one and zero injections, one obtains the following expression

$$\omega_{ijt} = \omega_{ijt-1} + \left(r_{jt} - r_{it}\right) + \left(f_{ijt} - f_{it}\right) + \theta_{it} + \epsilon_{ijt}, \tag{4}$$

where ω_{ijt} is the log of w_{ijt}, lowercase r represents the corresponding net returns associated with the gross returns described above, and θ_{it} and ϵ_{ijt} are the main components of a second order approximation error.[27] This expression clearly shows that in the absence of relative flows $\left(f_{ijt} - f_{it}\right)$ there is complete pass-through from relative returns $\left(r_{jt} - r_{it}\right)$ into weights (to a first order log approximation).

As mentioned above, the relative flows are at the complete discretion of the fund manager. We allow these flows to depend on lagged weights, relative returns, and the incidence of crises as follows,

$$\left(f_{ijt} - f_{it}\right) = \delta\omega_{ijt-1} + \eta\left(r_{jt} - r_{it}\right) + \gamma C_{\mathrm{jt}} + \varphi_{ij} + \nu_{ijt}, \tag{5}$$

where C_{jt} is a dummy variable that takes the value one if country j experiences a crisis at time t, φ_{ij} is a country of destiny-fund fixed effect, and ν_{ijt} is an error term. δ, η, and γ are parameters that capture the sensitivity of relative flows to lagged weights, relative returns, and crises, and the rest of the notation is the same as above. The inclusion of relative returns as determinants of relative flows is standard in the literature (e.g. Hau and Rey, 2008). We augment this dependence of flows on country performance by including the crisis indicator. The presence of lagged weights captures the possibility that flows respond to deviations of those weights from some desired target level.

Replacing Equation (5) back in Equation (4), we obtain the following empirical specification for the evolution of fund portfolio weights,

$$\omega_{ijt} = \alpha\omega_{ijt-1} + \beta\left(r_{jt} - r_{it}\right) + \gamma C_{jt} + \varphi_{ij} + \theta_{it} + u_{ijt}, \tag{6}$$

[27] We separate the two components because the θ_{it} term that contains expressions on r_{it}^2 and f_{it}^2 may become especially important when these variables significantly deviate from the approximation point. It may be, therefore, useful to control for them in a non-parametric manner.

where $\alpha = 1 + \delta$, $\beta = 1 + \eta$, and the rest of the notation is the same as above. This is an estimable equation that allows us to study the determinants of a fund's country portfolio allocations and, replacing the estimated parameters back into Equation (5), the determinants of its relative flows.[28,29]

Table 5 reports estimates of Equation (6) for equity funds (Panel A) and bond funds (Panel B). The regression includes country weights in the relevant region of a fund (i.e., countries in the main scope of investment, as described in Section 2), and excludes cash weights, which are analyzed separately. The first five columns report the main parameters of Equation (6) including different combinations of fixed effects that capture the different sources of variation of the data. The results in Column (1) include no fixed effects, while the results in Column (2) include fund and date fixed effects that decompose θ_{it} on its two dimensions. The results in Column (2) show that the coefficients are very similar to those without fixed effects and that these sources of variation do not have much explanatory power.[30] In the two columns, the coefficient on both lagged weights and relative returns are significantly positive, meaning that weights are serially correlated and positively correlated with relative returns.

The conclusions from the first two columns of Table 5 are not robust to the inclusion of other sets of fixed effects capturing shocks of higher dimensions. Columns (3), (4), and (5) include, alternatively and jointly, fund-date fixed effects and country of destiny-fund fixed effects. The results in Column (3), which include fund-date fixed effects, exhibit a significant increase in the coefficient for relative returns. They indicate that the low coefficient on relative returns documented in the initial columns is largely due to fund-level, time-varying shocks, such as those to injections and fund returns that are part of the approximation error in

[28] Note that the model described by Equation (6) corresponds to a dynamic panel and that omitting the fund-country fixed effect, or cleaning it by taking differences, will result in inconsistent parameters, especially for the lagged weights (Arellano and Bond, 1991). Estimating the fixed effects using the Least Squares Dummy Variable estimator is still asymptotically biased, but the bias is of the order of 1/T, where T is the time-series length of the typical fund. Because T is relatively large (50 observations for the median fund), this bias is small. Including and estimating the fixed effects is important.

[29] Although it is possible that the process for log weights has a unit root and that standard t-stats cannot be reliably used, standard panel unit root tests (Im-Pesharan) reject the hypothesis of a unit root in log weights. Second, as we report below, we also estimate specifications where the dependent variable is the difference between log current weights and the buy and hold benchmark. These differences should be stationary under both the null of a unit root and the alternative. Third, as described next, we estimate the specification at lower frequencies (semi-annual and annual), where weights are much more likely to differ from past weights.

[30] Results controlling for shocks to the fund at the country of origin level (unreported) are also similar to those obtained without fixed effects and to those obtained with fund and date fixed effects, indicating that shocks at the level of country of origin do not play an important role in the dispersion of portfolio allocations.

Equation (4).[31] When including the country of destiny-fund fixed effects (Column (4)), the coefficient on lagged weight declines significantly relative to the other columns. This is consistent with the existence of some stable "target" component of weights per country for each fund.

Including only the two sets of fixed effects that have some impact on the coefficients (country of destiny-fund and fund-date fixed effects), the regressions in Column (5) show that at the monthly level there is an important, albeit incomplete, degree of pass-through of relative returns to weights. Managers do not undo to an important extent the short-term impact of relative returns on their positions, and let them erode as a result of low returns. Using Equation (5) to uncover the behavior of relative flows, we find that they are weakly negatively related to relative returns at a monthly frequency.[32]

The regression in Column (6) further investigates the pro-cyclicality of fund allocations by including a country-crisis dummy, as in Equation (6), to test if funds react differently to crises periods. The results show that funds decrease their exposure to countries that experience crises. A crisis results in a 2% decline in the weights assigned to the affected country, on top of the decline implied by the relative returns. The strong negative relation between portfolio weights and country crises imply that fund flows also respond negatively to them. Thus, while relative flows are neutral or mildly contrarian during normal times, as shown in Column (6), they are strongly pro-cyclical during crises.

It is important, however, to be cautious about interpreting the contrarian behavior of relative flows during normal times as implying that funds wish to increase their exposure to underperforming countries. To reach that conclusion, one requires a model of the relation between relative flows and desired weights. Appendix 1 presents a simple but very flexible partial adjustment model of this relation, and shows that under reasonable assumptions, the results reported above are consistent with desired weights that are positively related to relative returns. The intuition for this apparent contradiction is that, in the model, relative flows depend on the difference between the fund's desired and initial (buy-and-hold) weights. If

[31] For instance, in the nonlinear version of the identity (Equation (3)) the impact of fund returns on weights depends, among other things, on its injections. If these injections are large, weights would be mainly driven by these injections and respond relatively less to returns. Furthermore, from an econometric standpoint, these fixed effects also control for time variation in the within-fund (across-country) dispersion of weights (captured in the average log weight), and identifies the importance of relative returns using only within-fund across-country variation in returns and allocations.

[32] For the readers interested in the parameters of the flow Equation (5), the working paper version of this paper reports the same regressions shown in Table 5 but using relative flows (the difference between log weights and log buy-and-hold weights) as dependent variable. The conclusions from this exercise remain the same.

desired weights are higher (lower) than buy-and-hold weights, money flows into (out of) a country. Because a decline in relative returns has a direct one-to-one pass-through impact on the buy-and-hold portfolio weights, if desired weights decline less than one-to-one with relative returns, relative flows would tend to move in a contrarian manner (even when desired weights decline with a fall in returns).

The last two columns of Table 5 repeat the specification in Column (6) using data aggregated at different frequencies. The results show that the importance of pass-through declines at lower frequencies, as funds have more time to adjust their positions after changes in relative prices. The same is valid for the response of flows which are more negatively related to relative returns as the frequency of data is reduced. Nonetheless, the negative relation between weights, flows, and crises is present at all frequencies.

The results for bond funds (Table 5, Panel B) are broadly similar to those for equity funds, but while the coefficients move in the same manner when various fixed effects are added, the pass-through of returns on weights is much smaller than among equity funds, implying that the underlying relative flows respond to returns in a contrarian fashion.[33] Quantitatively, a decline of 10 percentage points in a country's relative returns reduces its weight by about 6%. The response of weights and flows to crises is negative but statistically insignificant. Bond funds seem to behave in a more contrarian way than equity funds. This behavior may result from a lack of ability to quickly sell bonds of countries suffering strong reversals. Thus, in the short run bond funds may be forced to liquidate positions in countries that do relatively better in order to meet redemptions, but as they can slowly accommodate their positions they react pro-cyclically to return differentials. Another possible explanation is that the unobserved benchmarks followed by bond funds do not react as fast as those of equity funds to relative country returns. As we show below, these findings may also be explained by higher precautionary holdings of cash by bond funds than by equity funds.

We conducted a series of robustness checks on the basic specifications reported in Table 5 without finding significant changes in our results. Among these checks we estimated the model using only funds with at least three years of data, we added more lags of log weights and relative returns (up to three), we considered countries both inside and outside the relevant region, and we estimated the model separately for global equity funds and regional equity

[33] Note that this does not necessarily imply a contrarian response of total country flows because relative flows are measured relative to the injections to the fund, which we know react negatively to bad news.

funds. In all cases, the qualitative and quantitative results (available upon request) are similar to those reported in Table 5.

The log transformation used above and the regressions reported in Table 5 discard the information contained in the zero weight countries. It is not obvious if these zeroes should be included or not because some cases may correspond to countries that are out of the scope of investment of a fund for reasons we do not observe (prospectus or underlying unobserved benchmark). To check the concern that the zeroes may contain useful information while minimizing the probability of having zeroes that are unrelated to the scope of the fund, we re-estimated the regressions in levels including only the zeroes corresponding to countries that are in the region or market segment declared as part of the scope of the fund. To maintain consistency with the equation in logs, we include as explanatory variables the level of the buy-and-hold weight and the country's relative returns expressed as the ratio of the gross returns of the country and the portfolio. The results, shown in Table 6, are qualitatively consistent with those obtained with the specification in levels, despite significantly increasing the number of observations (from 460,000 to 740,000). Weights decline when relative returns fall and when a crisis hits a country. Quantitatively, the implied results are larger than in the log specifications. In equity funds, a 10% decline in relative returns would reduce weights by 1 percentage point, in addition to the pure pass-through effect. This is about 20% of the average weight (5%). The impact of a crisis is also larger: it results in a 10 percentage point decline in weights.

Both equity and bond funds maintain a fraction of their assets in cash. This cash may be used as a buffer to park money before and after buying and selling assets, meet redemptions, and strategically take advantage of sudden investment opportunities. The regressions in Table 7 characterize the behavior of the cash weights in logs. In unreported results, we also ran the same regression for cash in levels, obtaining similar results. The specifications are analogous to those reported above, with gross cash returns assumed to equal one so that relative returns correspond to minus fund net returns (specification in logs) and the inverse of funds' gross returns (specification in levels). Because cash weights vary only in the fund-time dimension, we limit the set of fixed effects included.

The results in Table 7 show that a decline in equity fund returns results in an increase in cash. In other words, equity funds accumulate extra cash in bad times and reduce these positions in good times. Quantitatively, a 10% decline in the return of the fund results in a 7% increase in cash. The results also show a significantly lower pass-through on cash weights, with

coefficients on log lagged cash weights and adjusted weights much smaller than one. The results in Column (3), which include time fixed effects, show that most of the positive relation between cash weights and cash relative returns results from variations in global conditions. After controlling for those fixed effects, the coefficient on relative returns, while still positive, becomes smaller than that of lagged weights and not significant. The regression in Column (4), without time fixed effects, shows that the variables capturing the prevalence of country and global crises are associated with both an increase in cash and a decline in the coefficients for relative returns, confirming that, to an important extent, the relevance of relative returns comes from global conditions. A fund experiencing a crisis in one of its target countries increases cash by 10% of the share of that country in its portfolio, and a fund experiencing a global crisis increases cash by 16%. Columns (5) and (6), with results at different frequencies, show again a smaller and vanishing degree of pass-through, indicating that at lower frequencies cash weights tend to converge to a target level that is not driven by price fluctuations. However, even at this level of aggregation country and global crises can explain some of the variation in cash weights.

Interestingly, the response of cash weights to returns is much different in bond funds. Among these funds, cash moves in opposite direction to returns, even though pass-through would suggest a positive response. Bond funds seem to accumulate cash when fund returns are high (low relative returns). Why is this effect dominant only for bond funds? This result may be due to the stronger response of injections to returns among bond funds (see Table 4): a high return results in injections that are temporarily parked in cash. Similarly, a bad fund return may require a decline in cash while the fund meets redemptions. Another explanation is that, because bond funds hold more cash on average, they are better able to respond to injections/redemptions through variations in cash without having to liquidate assets or relocate money across countries. This is only a proximate explanation because, of course, the level of cash held by bond funds is an endogenous choice. Nonetheless, one can rationalize both the level and cyclical fluctuations in cash if the bond markets where international funds invest are less liquid than the corresponding equity markets, so that funds cannot quickly adjust positions to meet redemptions without taking large losses through fire-sale prices, which may lead them to hoard more cash. These results can also explain the weaker response of country weights to relative returns among bond funds in the short run: a decline in country returns prompts bond funds to liquidate cash to meet redemptions, dampening the impact of this

decline on the country weights. Though unreported, results in levels including the zero cash weights are qualitatively similar to those in logs.

5. Gross and Net Capital Flows to Countries: The Role of Investors and Managers

In this section, we quantify the relative importance of the underlying investors and managers in explaining the gross and net capital flows by mutual funds to different countries. "Gross flows" are the growth rate of total assets invested by mutual funds in a country (including returns of past investments). "Net flows" are inflows/outflows of money (gross flows minus the return in each country).[34]

The assets held by mutual funds in country j trivially correspond to the sum of the assets held in that country by each one i of the funds that invest in it, $A_{jt} = \sum_i A_{ijt}$. Taking log differences we obtain the following decomposition for the growth rate of total assets in a country (gross flows)

$$\hat{A}_{jt} = \sum_i s_{ijt-1}\widehat{w}_{ijt} + \sum_i s_{ijt-1}\hat{A}_{it}, \qquad (7)$$

where $\hat{A}_{jt}$ denotes the growth rate of total mutual fund assets in country j at time t, $s_{ijt} = A_{ijt}/A_{jt}$ is the share of total country j assets represented by fund i, $\widehat{w}_{ijt}$ is the growth of the weight of country j in the portfolio of fund i between t and $t-1$ and, and $\hat{A}_{it}$ is the growth in total assets of fund i within the same interval.

Equation (7) states that gross flows of money from mutual funds to a country may increase because funds increase the weight of that country in their portfolios, or because the total assets of the funds investing in the country increase. The economic interpretation of these two components, as capturing the contribution of fund managers versus that of the underlying investors, requires taking a stance on the scope of activities within the realm of decision of each of these two sets of market participants. Assuming that changes in weights are the managers' choice and the growth rate of the fund assets is exogenously determined, one may interpret the first component as corresponding to the managers' decision and the second component to that of the underlying investors. This is one of the decompositions we estimate below.

[34] Note that this is a specific definition of gross and net flows that fits well with the discussion on this paper, but the literature has employed the terms with many other ways. For our computations, we use the growth rates of assets between two consecutive periods in a country using only the funds that have investments in that country in both periods. That is, we do not include entry-exit in the calculations. The reason is that we do not know whether entry-exit in our sample corresponds to real entry-exit or variations in data coverage.

The other main decomposition we use works with net flows to a country (growth in total assets net of returns, f_{jt}) by isolating the contribution of the growth in weights net of returns (relative flows) and injections to net flows, in the following manner,

$$f_{jt} = \sum_i s_{ijt-1}\left(\widehat{w}_{ijt} - \left(r_{jt} - r_{it}\right)\right) + \sum_i s_{ijt-1} f_{it}$$
$$f_{jt} = \sum_i s_{ijt-1}\left(f_{ijt} - f_{it}\right) + \sum_i s_{ijt-1} f_{it}. \quad (8)$$

A nice feature of the decomposition in Equation (8) is that both terms have a very clear economic interpretation. The first term is the change in weights net of relative returns, which corresponds to relative flows of managers to a country, and the second corresponds to injections/redemptions into the fund. The flows of fund money to country j increase either because the fund has injections by the underlying investors that are proportionally allocated to all countries, or because the fund manager is investing relatively more money into the country. Appendix 2 shows two other decompositions.

The results of the decompositions in Equations (7) and (8) are reported in two separate panels of Table 8 and offer a good picture of the role of managers and investors in explaining gross and net capital flows to countries. Each panel reports two sets of results: the average contribution of each of the two components to the level and variance of each type of flow.

To illustrate what Table 8 reports, take the example of gross flows in Panel A. The calculation for the left side of the panel (the "shares") is as follows: for each country and time period we compute the share of each component (growth in weights and growth in fund assets) in the growth of the country's gross assets. We then compute for each country the average over time of each of these components, and finally take their average across all countries in each of the groupings in the rows.[35] The right side of each panel ("variance decomposition") reports a standard variance decomposition exercise, where we assess the share of the total variance of gross flows that can be attributed to each component. We again first conduct the variance decomposition at the country level and then average across countries to reach the reported estimates. Because the two terms are not orthogonal, we follow Klenow and Rodriguez-Claire (2005) and impute the covariance term equally to each component (see Section 3).

Table 8, Panel A shows that both components of Equation (7) have roughly a similar impact on the level and fluctuations in gross assets (around a 40%-60% split depending on the

[35] We use both a geographical grouping (Asia, Eastern Europe, and Latin America) and another one (developed, emerging, and non-emerging developing countries) taken from MSCI. Non-emerging developing countries are the ones considered frontier markets by MSCI.

decomposition). That is, the growth of weights and the growth of fund assets are not very different in explaining the gross flows into countries, although the contribution of the former is largely due to fluctuations in relative returns that are correlated with the movement in gross flows. After controlling for this effect, managers explain 30% of the variation (see working paper version of this paper). In sum, Panel A shows that variations in the assets of funds, resulting at least partly from the behavior of the underlying investors, explain an important share of the level and variability of gross flows. If one considers changes in weights due to variations in returns part of manager's choices, managers explain about 60% of the variance of gross flows. If not, they still explain a smaller, but nontrivial share.

Table 8, Panel B shows the decomposition of net flows corresponding to Equation (8). The results are clearly different from those for gross flows. In this case, the first component, associated with manager behavior, explains a larger share of the level and variance of these flows. Net flows are more closely linked to managerial discretion than gross flows because they abstract from the effect of returns on the growth of asset holdings. For all countries, the growth rate of adjusted weights explains 88% of the level of net flows and 85% of their variance. The second term, associated with total injections, explains 12% and 15% of the level and variance of net flows, respectively. The pattern is very similar across groups of countries.

In summary, Table 8 shows that both managers and the underlying investors play a significant role in explaining the level and fluctuations of international gross and net flows but the relative importance of each of them varies with the type of flow. For gross flows, managers explain a share of the level and variance of flows of around 50%, when not adjusting for returns and depending on the specific decomposition and region. For net flows, however, the bulk of the level and variance of flows (between 77% and 88%) can be explained by manager behavior. Managerial discretion, measured as deviations of country allocations from buy-and-hold allocations, is very important in explaining the flows of new money to countries.

Table 9 shows the same decompositions as in Table 8 for all countries but for different types of funds. In each case, the gross and net flows to a country correspond only to the flows coming from that subset of funds. The table also shows decompositions at different frequencies: semi-annual and annual instead of monthly. Not surprisingly, the growth of total weights, capturing manager behavior, explains always a much larger fraction of the level and volatility of gross flows for active funds than for passive funds. For instance, Table 9, Panel A shows that the growth of weights accounts for 49% and 58% of the level and variance of gross flows for

active funds, versus 22% and 32% for passive funds, respectively. Panel B shows that the difference between active and passive funds in the contribution of manager behavior to net flows is even larger: 87% of the level and variance for active funds, and 15% of the level and 31% of the variance for passive funds, respectively. Namely, the gross and net flows of capital from passive funds to countries respond mainly to the behavior of the underlying investors. Regarding the difference between bond and equity funds, manager behavior seems to play a slightly larger role among bond funds, for both gross and net flows. Regarding the differences between monthly, semi-annual, and annual frequencies, Table 9 shows a clear pattern. For both levels and variances of gross and net flows, the role of manager behavior declines with the increase in the length of the period of analysis. Although as seen in Section 4, the ability of managers to change country weights with respect to a buy-and-hold benchmark increases with time, it is also the case that the underlying investors can react further to fund performance, country conditions, or other shocks. At lower frequencies, the investor side seems to become relatively more important.

In addition to providing a quantitative assessment of the relative importance of manager's and underlying investor's choices for mutual fund capital flows to target countries, the decompositions above, together with our previous estimations, allow us to obtain some back-of-the-envelope calculations of the impact of various shocks on capital flows. Starting with Equation (7) for gross flows, we know from Table 4 that a 10% decline in (lagged) fund returns reduces injections by about 1 percentage point. Thus, if all funds investing in a country experience such a decline in returns, gross flows will decline in 1 percentage point through its impact on the total assets of these funds (the second term in Equation (7)). This is close to the median gross flows across countries (about 2%) and indicates that there may be important contagion through the injections of the underlying investors. Similarly, a 10% decline in the returns of the country where the funds are located will reduce injections to these funds by 2 percentage points. If funds located in the country experiencing the decline are important for a target country, the decline in gross flows will be significant. From Table 6 we also find that a decline in the relative return of a country has almost a one-to-one impact on the growth of weights at a monthly frequency. Keeping fund returns constant, a 10% decline in relative returns results in a 10% decline in the weight of that country in mutual fund portfolios and may induce a similar decline in gross flows. A country crisis also has an important effect, reducing the growth of weights by almost 2%, with a corresponding decline in gross flows.

A similar set of calculations can be conducted to estimate the impact of various shocks on net (mutual fund) capital flows to a country using Equation (8). Changes in fund injections have the same direct impact on net flows than in gross flows, so a 10% decline in last period returns may reduce net inflows by 1 percent, or a 10% decline in the returns in the country of origin of the funds may contract inflows by 2 percent. Relative returns also matter. As discussed above, Table 5 shows that a 10% decline in relative returns results in a 0.5 percentage point increase in relative flows, which is similar to the (unweighted) average growth of net flows in the sample (minus 1.5%). However, if this relative return decline is accompanied by a low fund performance or by low returns in the country of origin of funds that induce large redemptions, the consequences for net capital flows may still be severe (3 to 4 percentage point decline).

6. Conclusions

This paper shows that mutual funds help transmit crises across countries and that their behavior is driven by both the underlying investors and managers. The global crisis was no exception, when there were large reallocations across countries and regions. In particular, our paper shows that investors react to shocks by pulling out of funds that invest in countries undergoing crises and during global crisis times. In addition, investors put more capital into funds that have shown to do relatively well and when conditions in their country of origin improve. This pro-cyclical reaction of investors is matched with a similar behavior by fund managers, who face not only shocks from investors injecting and redeeming capital but also from valuation changes in the countries in which they invest. Managers react to these shocks by allowing weights to adjust almost pari passu with returns and partly by moving allocations out of countries experiencing crises. This adjustment of managers takes place over time, with the pass-through from returns to weights diminishing at lower frequencies. During crises, managers of equity funds also tend to accumulate more cash. All these patterns are consistent with how investors and managers behaved during the global crisis, when there was retrenchment from emerging economies and Europe and a reallocation towards the U.S.

The findings in this paper have important implications for the theoretical and the policy discussions. They suggest that in a world where investors discipline managers through injections and redemptions and where they suffer shocks, managers of open-end funds might have difficulties taking advantage of long-term arbitrage opportunities and reacting counter-

cyclically, for example by buying assets internationally at fire-sale prices. Therefore, the evidence is not consistent with international deep-pocket investors (mutual funds in this case) playing a stabilizing role. To the contrary, these investors appear fickle.

Regarding the difference between debt and equity, our paper shows that the results are not unique to demandable debt, where the need to get out first is more imperative. The pro-cyclicality occurs even in equity funds for which prices adjust instantaneously, suggesting that limited information by investors and/or other factors play an important role. While in equity funds cash is used pro-cyclically, being accumulated during crises, in bond funds cash is used more as a buffer, reducing the impact of redemptions on manager reallocations. This could suggest that managers have more difficulty buying and selling bonds in markets that might be more illiquid, and thus use more cash to weather the shocks they face. The results also suggest that, when there is a shock in a country where funds invest, equity funds tend to amplify the shock by acting pro-cyclically, while bond funds might help transmit shocks across countries by acting in relative terms counter-cyclically in that country, generating contagion effects. However, when the shock hits the country of origin where funds are domiciled, both bond and equity funds reduce their investments abroad, implying that wealth effects are large. These wealth effects tend to dominate the substitution effects across countries and constitute a mechanism of cross-country crisis transmission.

The evidence also shows that weights are not constant over time. In fact, they fluctuate substantially with shocks. In other words, it is not the case that investors drive all the action and managers act as passive agents, allocating the injections they receive into countries according to some rough fixed weights. While changes in weights might partly reflect monthly changes in the benchmark indexes (changing with returns), the findings also suggest that adjustment costs play a role in manager behavior. Valuation changes pass through to portfolios weights almost entirely in the short run; only over time they get adjusted and somewhat return to pre-shock levels. These adjustment costs could take place because it is difficult for managers to adjust immediately to the shocks they face and react to them in the short run, by buying or selling assets in certain countries before adjusting the portfolio elsewhere. These effects are more pronounced during crisis times, because in relative terms managers reallocate their portfolio towards countries that suffer negative shocks during normal times. For example, equity fund flows are slightly counter-cyclical during normal times and pro-cyclical during crises. These differences are consistent with adjustment costs being larger during crises and

shed light on the heterogeneity of behavior of equity funds over time. The evidence could also indicate that the managers' target or desired weights themselves fluctuate with returns.

The findings in this paper also have important implications for the policy discussion. In particular, some of the proposals after the global crisis suggest a shift from banks to a mutual fund model to avoid runs and contagion effects. This paper shows that this shift will not necessarily solve the problem that banks entail and that runs and contagion are possible even in equity funds. The findings also suggest that idiosyncratic risk and market discipline play only a limited role during crises and, thus, regulation based on those pillars (such as Basel II) would not entirely isolate the financial system from crises. Furthermore, to the extent that open-end structures constrain long-term arbitrage, there could be socially excessive open-ending and it might be desirable to have more closed-end instruments. However, open-end funds provide more room for investors to monitor managers and avoid moral hazard problems, implying a difficult trade-off between monitoring and long-term investments (Stein, 2005). Another area for possible policy action is the potential for mutual funds to become a source of instability in domestic markets. Recent work suggests that this might be the case (Jotikasthira et al., 2009). This instability might push prices away from fundamental values and in turn generate more negative reactions from managers (triggering a positive feedback loop).

To conclude, the findings in this paper suggest that shocks to the supply side of funds are hard to dismiss. The actions by different players within institutions interact and get magnified, plus foreign investors (in this case mutual funds) play no stabilizing role. This has important policy lessons in terms of liquidity provision and moral hazard. To the extent that shocks come from the supply side of funds, providing liquidity at times of crisis might help stabilize markets and countries. If instead crises were country specific with investors expecting unreasonable rates of returns, providing financing at times of crisis might fuel moral hazard.

References

Allen, F., Gale, D., 2000. Optimal Currency Crises. Carnegie-Rochester Series on Public Policy 53, 177-230.

Allen, F., Gale, D., 2007. Systemic Risk and Regulation, in: Carey, M., Stulz, R., (Eds.), The Risks of Financial Institutions. NBER, Edition 1, Part 3, Chapter 7, 341-376.

Arellano, M., Bond, S., 1991. Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations. Review of Economic Studies 58 (2), 277-297.

Andersen, T., Bollersley, T., Diebold, F., Vega, C., 2007. Real-time Price Discovery in Global Stock Bonds and Foreign Exchange Markets. Journal of International Economics 73 (2), 257-277.

Borensztein, E., Gelos, G., 2003. A Panic-Prone Pack? The Behavior of Emerging Market Mutual Funds. IMF Staff Papers 50 (1), 43-63.

Boyer, B., Kumagai, T., Yuan, K., 2006. How Do Crises Spread? Evidence from Accessible and Inaccessible Stock Indices. Journal of Finance 61 (2), 957-1003.

Broner, F., Gelos, G., Reinhart, C., 2006. When in Peril, Retrench: Testing the Portfolio Channel of Contagion. Journal of International Economics 69 (1), 203-230.

Broner, F., Didier, T., Erce, A., Schmukler, S., 2010. Gross Capital Flows: Dynamics and Crises. Banco de España Working Paper 1039 and CEPR Discussion Paper 8591.

Broner, F., Lorenzoni, G., Schmukler, S., 2011. Why Do Emerging Economies Borrow Short Term? Journal of the European Economic Association, forthcoming.

Brunnermeier, M., 2009. Deciphering the Liquidity and Credit Crunch 2007-2008. Journal of Economic Perspectives 23 (1), 77-100.

Bulow, J., Geanakoplos, J., Klemperer, P., 1985. Multilateral Oligopoly: Strategic Substitutes and Strategic Complements. Journal of Political Economy 93, 488-511.

Calomiris, C., 2008. The Subprime Turmoil, What's Old, What's New, and What's Next. Journal of Structured Finance 15 (1), 6-52.

Calvo, G., 2002. Contagion in Emerging Markets: When Wall Street is a Carrier. Proceedings from the International Economic Association Congress, Vol. 3, Buenos Aires, Argentina.

Cetorelli, N., Goldberg, L., 2011. Global Banks and International Shock Transmission: Evidence from the Crisis. IMF Economic Review 59 (1), 41-76.

Chan, K., Covrig, V., Ng, L., 2005. What Determines the Domestic Bias and Foreign Bias? Evidence from Mutual Fund Equity Allocations Worldwide. Journal of Finance 60 (3), 1495-1534.

Chang, R., Velasco, A., 2001. A Model of Financial Crises in Emerging Markets. The Quarterly Journal of Economics 116 (2), 489-517.

Chevalier, J., and Ellison, G., 1997. Risk Taking by Mutual Funds as a Response to Incentives. Journal of Political Economy 105 (6), 1167-1200.

Cifuentes, R., Ferrucci, G., Shin, H., 2005. Liquidity Risk and Contagion. Journal of the European Economic Association 3 (2-3), 556-566.

Claessens, S., Forbes K., 2001. International Financial Contagion. Kluwer Academic Publishers, Boston.

Dahlquist, M., Robertsson, G., 2001. Direct Foreign Ownership, Institutional Investors and Firm Characteristics. Journal of Financial Economics 59 (3), 413-440.

Devereux, M., Yetman, J., 2010. Leverage Constraints and the International Transmission of Shocks. Journal of Money, Credit, and Banking 42 (1), 71-105.

Diamond, D., Dybvig, P., 1983. Bank Runs, Deposit Insurance, and Liquidity. Journal of Political Economy 91 (3), 401-419.

Diamond, D., Rajan, R., 2005. Liquidity Shortages and Banking Crises. Journal of Finance 60 (2), 615-647.
Didier, T., Rigobon, R., Schmukler, S., 2010. Unexploited Gains from International Diversification: Patterns of Portfolio Holdings around the World. NBER Working Paper 16629.
Eichengreen, B., Mody, A., Nedeljkovic, M., Sarno, L., 2009. How the Subprime Crisis Went Global: Evidence from Bank Credit Default Swap Spreads. NBER Working Paper 14904.
Forbes, K., Warnock, F., 2011. Capital Flow Waves: Surges, Stops, Flight, and Retrenchment. NBER Working Paper 17351.
Fratzscher, M., 2011. Capital Flows, Push versus Pull Factors and the Global Financial Crisis. NBER Working Paper 17357.
Gelos, R., Wei, S., 2005. Transparency and International Portfolio Holdings. Journal of Finance 60 (6), 2987-3020.
Gompers, P., Metrick, A., 2001. Institutional Investors and Equity Prices. Quarterly Journal of Economics 116 (1), 229-259.
Gorton, G., Metrick, A., 2011. Securitized Banking and the Run on Repo. Journal of Financial Economics, forthcoming.
Gourinchas, P., Rey, H., 2007a. From World Banker to World Venture Capitalist: U.S. External Adjustment and the Exorbitant Privilege, in: Clarida, H., (Ed.), G7 Current Account Imbalances: Sustainability and Adjustment, Edition 1, Chapter 1, 11-66. NBER.
Gourinchas, P., Rey, H., 2007b. International Financial Adjustment. Journal of Political Economy 115 (4), 665-703.
Gourinchas, P., Govillot, N., Rey, H., 2010. Exorbitant Privilege and Exorbitant Duty. IMES Discussion Paper 10-E-20. Bank of Japan.
Gourinchas, P., Obstfeld, M., 2011. Stories of the 20th Century for the 21st. Mimeo. University of California, Berkeley.
Grinblatt, M., Titman, S., Wermers, R., 1995. Momentum Investment Strategies, Portfolio Performance and Herding: A Study of Mutual Fund Behavior. American Economic Review 85 (5), 1088-1105.
Hau, H., Rey, H., 2006. Exchange Rates, Equity Prices, and Capital Flows. Review of Financial Studies 19 (1), 273-317.
Hau, H., Rey, H., 2008. Global Portfolio Rebalancing under the Microscope. NBER Working Paper 14165.
Hellwig, M., 2009. Systemic Risk in the Financial Sector: An Analysis of the Subprime-Mortgage Financial Crisis. De Economist 157 (2), 129-207.
Jotikasthira, C., Lundblad, C., Ramadorai, T., 2012. Asset Fire Sales and Purchases and the International Transmission of Financial Shocks. Forthcoming, Journal of Finance.
Kaminsky, G., Reinhart, C., 2000. On Contagion, Crisis and Confusion. Journal of International Economics 51 (1), 145-168.
Kaminsky, G., Lyons, R., Schmukler, S., 2004. Managers, Investors, and Crises: Mutual Fund Strategies in Emerging Markets. Journal of International Economics 64 (1), 113-134.
Kang, J., Stulz, R., 1997. Why is there a Home Bias? An Analysis of Foreign Portfolio Equity Ownership in Japan. Journal of International Economics 64 (1), 113-134.
Kim, W., Wei, S., 2002. Foreign Portfolio Investors Before and During a Crisis. Journal of International Economics 56 (1), 77-96.
Klenow, P., Rodriguez-Clare, A., 2005. Externalities and Growth, in: Aghion, P., Durlauf, S., (Eds.), Handbook of Economic Growth, Edition 1, Volume 1, Chapter 11, 817-861.

Kodres, L., Pritsker, M., 2002. A Rational Expectations Model of Financial Contagion, Journal of Finance 57 (2), 769-799.
Krugman, P., 2008. The International Finance Multiplier. Mimeo. Princeton University.
Martinez Peria, M., Powell, A., Vladkova-Hollar, I., 2005. Banking on Foreigners: The Behavior of International Bank Claims on Latin America, 1985-2000. IMF Staff Papers 52 (3), 430-461.
Mendoza E., 2010. Sudden Stops, Financial Crises, and Leverage. American Economic Review 100, 1941-1966.
Mendoza, E., Quadrini, V., 2010. Financial Globalization, Financial Crises, and Contagion. Journal of Monetary Economics 57 (1), 24-39.
Mendoza, E., Smith, K., 2006. Quantitative Implications of a Debt-Deflation Theory of Sudden Stops and Asset Prices. Journal of International Economics 70 (1), 82-114.
Milesi-Ferretti, G., Tille, C., 2010. The Great Retrenchment: International Capital Flows during the Global Financial Crisis. IHEID Working Paper 18-2010. Graduate Institute of International Studies.
Mishkin, F. S., 2011. Over the Cliff: From the Subprime to the Global Financial Crisis. Journal of Economic Perspectives 25(1), 49–70.
Morck, R., Yeung, B., Wu, W., 2000. The Information Content of Stock Markets: Why Do Emerging Markets Have Synchronous Stock Price Movements? Journal of Financial Economics, 59 (1-2), 215-260.
Raddatz, C., 2010. When the Rivers Run Dry: Liquidity and the Role of Wholesale Funds in the Transmission of the U.S. Subprime Crisis. Policy Research Working Paper 5039. The World Bank.
Raddatz, C., Schmukler, S., 2011. On the International Transmission of Shocks: Micro-Evidence from Mutual Fund Portfolios. NBER Working Paper 17358.
Rajan, R., 2005. Has Financial Development Made the World Riskier? Proceedings, 313-369. Federal Reserve Bank of Kansas City.
Scharfstein, D., Stein, J., 1990. Herd Behavior and Investment. American Economic Review 80 (3), 465-479.
Schwert, G., 1989. Why Does Stock Market Volatility Change over Time? Journal of Finance 44 (5), 1115-1153.
Shiller, R., 2008. The Subprime Solution: How Today's Global Financial Crisis Happened, and What to Do About It. Princeton University Press. Princeton, NJ.
Shin, H., 2009. Reflections on Modern Bank Runs. A Case Study on Northern Rock. Journal of Economic Perspectives, 23 (1), 101-119.
Shleifer, A., Vishny, R., 1997. The Limits of Arbitrage, Journal of Finance, 52 (1), 35-55.
Shleifer, A., Vishny, R., 2011. Fire Sales in Finance and Macroeconomics, Journal of Economic Perspectives, 25(1): 29–48.
Sirri, E., Tufano, P., 1998. Costly Search and Mutual Fund Flows. Journal of Finance, 53 (5), 1589-1622.
Stein, J., 2005. Why Are Most Funds Open-End? Competition and the Limits to Arbitrage. Quarterly Journal of Economics 120 (1), 247-272.
Stein, J., 2009. Presidential Address: Sophisticated Investors and Market Efficiency. Journal of Finance 64, 1517-1548.
Wermers, R., 1999. Mutual Fund Herding and the Impact on Stock Prices. Journal of Finance 54 (2), 581-622.

Appendix 1: Partial Adjustment Model

The results in Section 4 regarding how managers choose portfolio allocations can be interpreted in light of a basic partial adjustment model. Starting with the identity in Equation (4) and transforming it into an estimable equation requires an expression for the relative flows. Intuitively, relative flows depend on the portfolio weight a fund wants to have in a given country at a point in time and on its current portfolio weight on that country. If the former is greater than the latter, the fund will try to move relatively more money into the country and vice versa. This intuition can be captured by a simple partial adjustment model,

$$f_{ijt} - f_{it} = \lambda\left(\omega^{*}_{ijt} - \widetilde{\omega}_{ijt}\right) + \chi_{ijt}\ , \tag{A1}$$

where ω^{*}_{ijt} is the log *desired weight* in the country and $\widetilde{\omega}_{ijt} = \omega_{ijt-1} + \left(r_{jt} - r_{\mathrm{it}}\right)$ is the log buy-and-hold weight that fund i faces before any flows or injections are realized. The parameter λ captures the fund's speed of adjustment towards its desired weight. If λ is equal to one, the fund immediately adjusts its weights to its desired level through changes in relative flows; λ smaller than one means that adjustment costs preclude a fund from immediately reaching its target.

This simple description of flows is completely agnostic about the desired portfolio weight ω^{*}_{ijt}, which is likely the outcome of a fund's optimal portfolio allocation. However, one can parametrically relate these desired weights to country and fund characteristics. In particular, we consider the following equation for log desired weights

$$\omega^{*}_{ijt} = \delta_{ij} + \phi\omega_{ijt-1} + \eta\left(r_{jt} - r_{it}\right) + \psi C_{ijt} + \nu_{ijt}. \tag{A2}$$

Although admittedly arbitrary, this specification is also very flexible and embeds several alternative forms for the desired weights. For instance, if ϕ, η, and ψ are all equal to zero, and δ_{it} is different from zero, it implies that a fund's desired country weights are roughly constant. But if η is different from zero, it means that the desired weight responds to changes in relative returns. The C_{ijt} variables allow us to test for the impact of crises on desired weights.

Replacing Equation (A2) in Equation (A1) we obtain an expression that is analogous to Equation (5) and may be interpreted as a reduced form representation of this partial adjustment model. Analogously, replacing Equations (A1) and (A2) in Equation (4) we obtain the following estimable equation

$$\begin{aligned}\omega_{ijt} = \left(1 - \lambda(1-\phi)\right)\omega_{ijt-1} + (1 - \lambda(1-\eta))\left(r_{jt} - r_{it}\right) + \\ \lambda\psi X_{ijt} + \lambda\delta_{ij} + \theta_{it} + \lambda\nu_{ijt} + \chi_{ijt} + \epsilon_{ijt},\end{aligned} \tag{A3}$$

After grouping parameters, Equation (A3) is analogous to Equation (6). This representation makes apparent that the coefficients on lagged weights (α) and relative returns (β) embed both the pure buy-and-hold effect (captured by the 1 embedded in the coefficients) and the response of relative flows to these variables due to adjustment costs (the speed of adjustment λ) and the sensitivity of desired weights to lagged weights and relative returns (ϕ and η).

Under some identification assumptions, the simple framework described above allows us to use the parameters estimated from Equation (6) to learn about the determinants of the behavior of portfolio managers. The presence of lagged weights in Equation (A2) captures the persistence of some determinants of desired weights that are not captured by the rest of the model. Therefore, it is reasonable to assume that $\phi \geq 0$. If one assumes that $\phi = 0$, the coefficient on log lagged weights provides direct information on the speed of adjustment. A smaller coefficient α implies a larger λ and a smaller adjustment cost (a lower λ is associated with greater adjustment costs). Similarly, finding a coefficient on relative returns, β, different from one does not provide immediate evidence that portfolio managers adjust their desired weights ω_{ijt}^{*} in response to returns, because it may just come from the presence of costs of adjusting portfolio weights ($\beta = 1 - \lambda$ when $\eta = 0$).

Under the mild assumption that $\phi \geq 0$, what really provides information about the relation between returns and desired weights is the difference between the coefficients estimated for relative returns and log lagged weights, which corresponds to $\lambda(\eta - \phi)$. In this case, a coefficient on relative returns larger than the coefficient for lagged weights means that η is also positive and that desired weights and, hence, relative flows, increase with relative returns (inducing a momentum component in the behavior of relative flows).

The results for the preferred specifications with fund-time and country of destiny-fund fixed effects (Table 5) yield coefficients for relative returns that are larger than those for lagged weights. This suggests that desired portfolio weights are positively correlated with a country's relative return. Namely, funds would like to reduce their portfolio weights in a country with negative relative returns. But to the extent that the impact of relative returns on desired weights is less than one-to-one ($\eta \leq 1$), the pass-through from relative returns to buy-and-hold weights ($\widetilde{\omega}_{ijt}$) dominates and the fund increases its relative flows to that country. Intuitively, desired weights are declining less than the direct decline due to relative returns. This may paradoxically result in relative flows that are negatively associated with relative returns.

Appendix 2: Two Other Decompositions of Gross and Net Flows

One may obtain other decompositions of gross and net flows. Start with Equation (7) for gross flows: $\hat{A}_{jt} = \sum_i s_{ijt-1}\hat{w}_{ijt} + \sum_i s_{ijt-1}\hat{A}_{it}$. The first term may grow due to of increases in country returns given that a country weight can also be expressed as $w_{ijt} = w_{ijt-1}\frac{(R_{ijt}+f_{ijt})}{(R_{it}+f_{it})}$. Whether one should attribute that increase to a manager decision is open to debate and depends on what "passive benchmark" one has in mind (the counterfactual weight under a "passive" strategy). Attributing the whole growth in weights to managers is akin to having the past period's weight as the passive benchmark. One way of tackling this issue, which is equivalent to considering a different benchmark, is to re-arrange Equation (7) in a way that removes changes in relative returns from the first term,

$$\hat{A}_{jt} = \sum_i s_{ijt-1}\left(\hat{w}_{ijt} - \left(r_{jt} - r_{it}\right)\right) + \sum_i s_{ijt-1}\left(\hat{A}_{it} + (r_{jt} - r_{it})\right),$$

$$\hat{A}_{jt} = \sum_i s_{ijt-1}\left(\hat{w}_{ijt} - \left(r_{jt} - r_{it}\right)\right) + \sum_i s_{ijt-1}(f_{it} + r_{jt}), \quad \text{(A4)}$$

where the second step uses the fact that $\hat{A}_{it} = r_{it} + f_{it}$. In this decomposition, the first component corresponds to the growth in weights that is not related to returns and depends only on relative flows from fund i to country j, $f_{ijt} - f_{it}$. This way of measuring the contribution of managers implicitly assumes a buy-and-hold strategy as the passive benchmark and only considers deviations from buy-and-hold weights as the responsibility of the managers. The second component has no clear economic interpretation and embeds the other two forces that drive the growth in total assets: injections and the return of the country.

Similarly, net flows to a country (growth in total assets net of returns) can be decomposed from Equation (8) to isolate the contribution of total changes in weights as:

$$f_{jt} = \sum_i s_{ijt-1}\hat{w}_{ijt} + \sum_i s_{ijt-1}(f_{it} - (r_{jt} - r_{it})). \quad \text{(A5)}$$

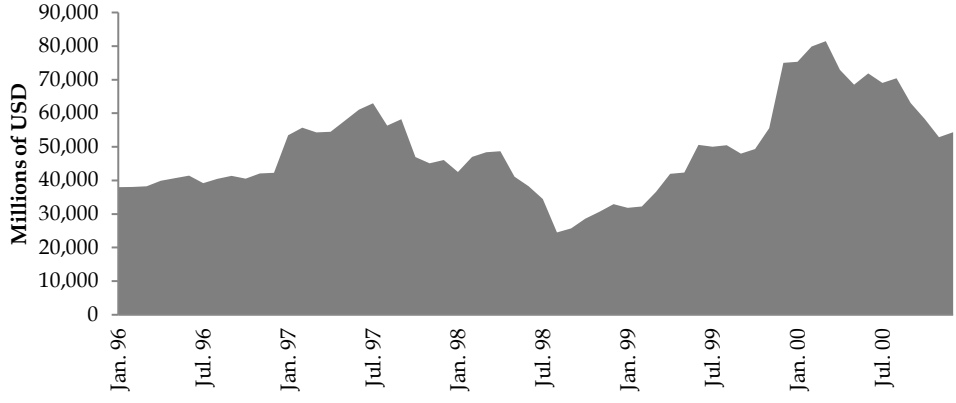
The first term above allows us to separate the contribution of the total growth in weights to net flows, but the second term embeds the contribution of injections net of relative returns.

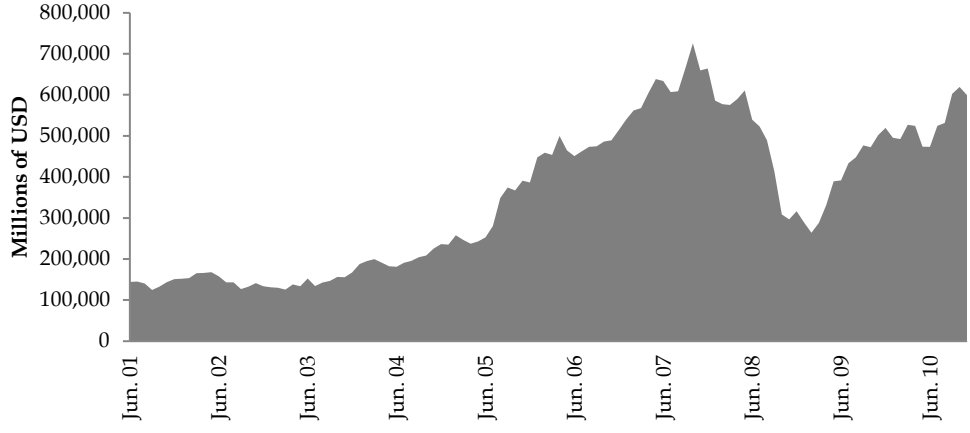
The working paper version of this paper reports the results using these decompositions. They suggest that the trend of gross flows is slightly dominated by the growth of fund assets, but that most fluctuations around that trend come from the growth in weights. Moreover, the role of manager behavior is larger when associated with changes in weights adjusted by relative returns (equivalent to relative flows) than when considering the total growth of weights. Net flows are more closely associated, at least on a monthly frequency, with relative flows allocated by managers across countries than with movements in returns.

Figure 1
Evolution of Total Assets in Mutual Funds

Panel A presents the total amount of assets in equity funds. The upper figure shows the period from January 1996 to December 2000 and the lower figure shows the period from June 2001 to November 2010. Panel B presents the total amount of assets in bond funds for the whole period, from July 2002 to November 2010.

A. Equity Funds





B. Bond Funds

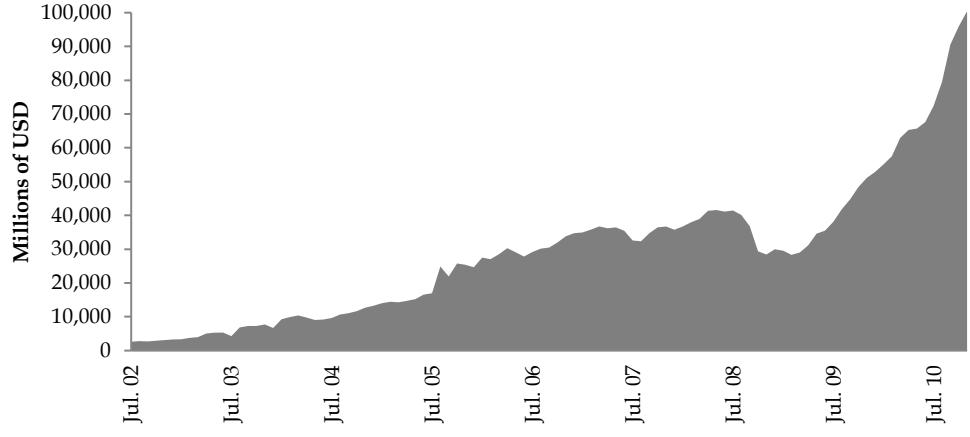


Figure 2
Equity Funds Portfolio Weights around the Global Financial Crisis

This figure presents the evolution of equity funds' average portfolio weights invested in different regions around the 2008 global financial crisis. Regions are aggregated according to the EPFR classification. Only funds that have complete coverage for the period under study (Jan. 2007 - Dec. 2009) are considered. The grey bars indicate times of stock market turmoil or the fall of financial institutions. In chronological order, they represent: the nationalization of Northern Rock (Sep. 2007), the Bear Stearns collapse (Mar. 2008), the Lehman Brothers collapse (Sep. 2008), and the AIG near-collapse (Mar. 2009).

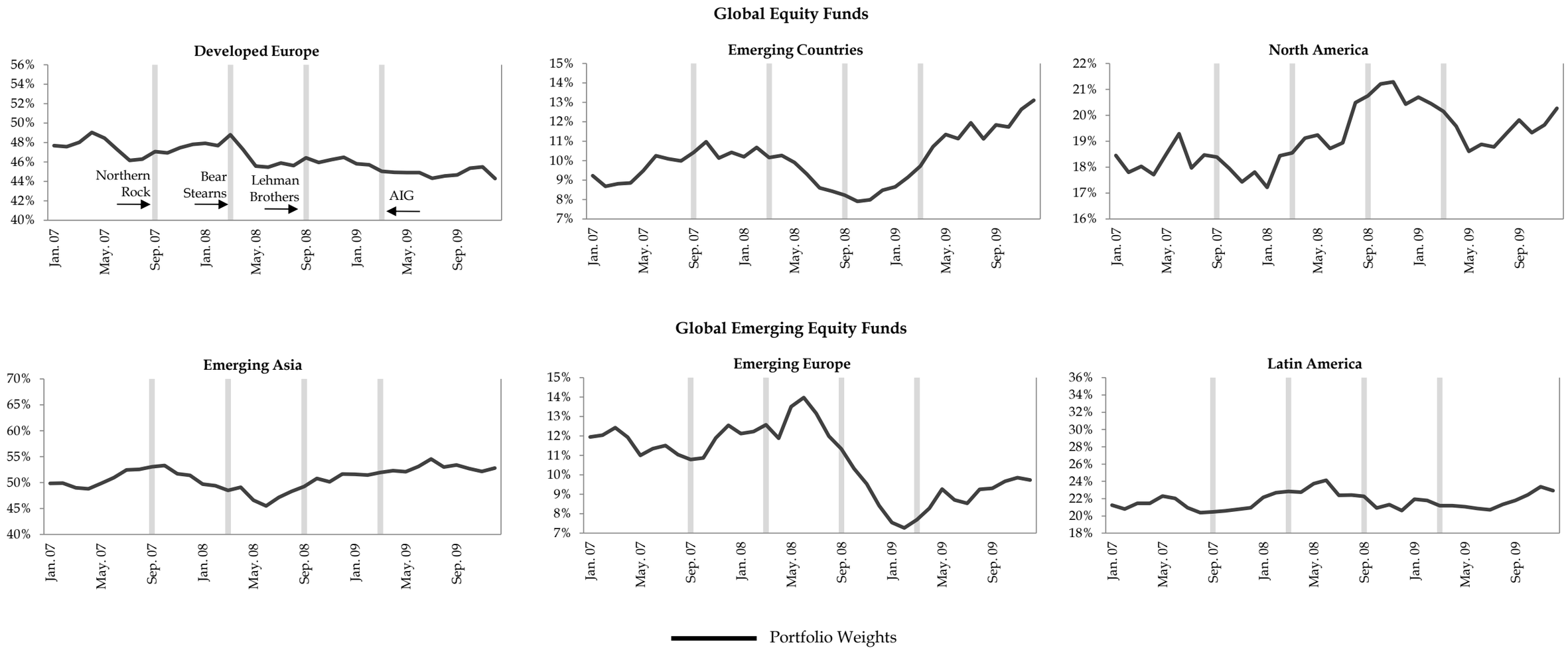


Figure 3
Bond Funds Portfolio Weights around the Global Financial Crisis

This figure presents the evolution of bond funds' average portfolio weights invested in different regions around the 2008 global financial crisis. Regions are aggregated according to the EPFR classification. Only funds that have complete coverage for the period under study (Jan. 2007 - Dec. 2009) are considered. The grey bars indicate times of stock market turmoil or the fall of financial institutions. In chronological order, they represent: the nationalization of Northern Rock (Sep. 2007), the Bear Stearns collapse (Mar. 2008), the Lehman Brothers collapse (Sep. 2008), and the AIG near-collapse (Mar. 2009).

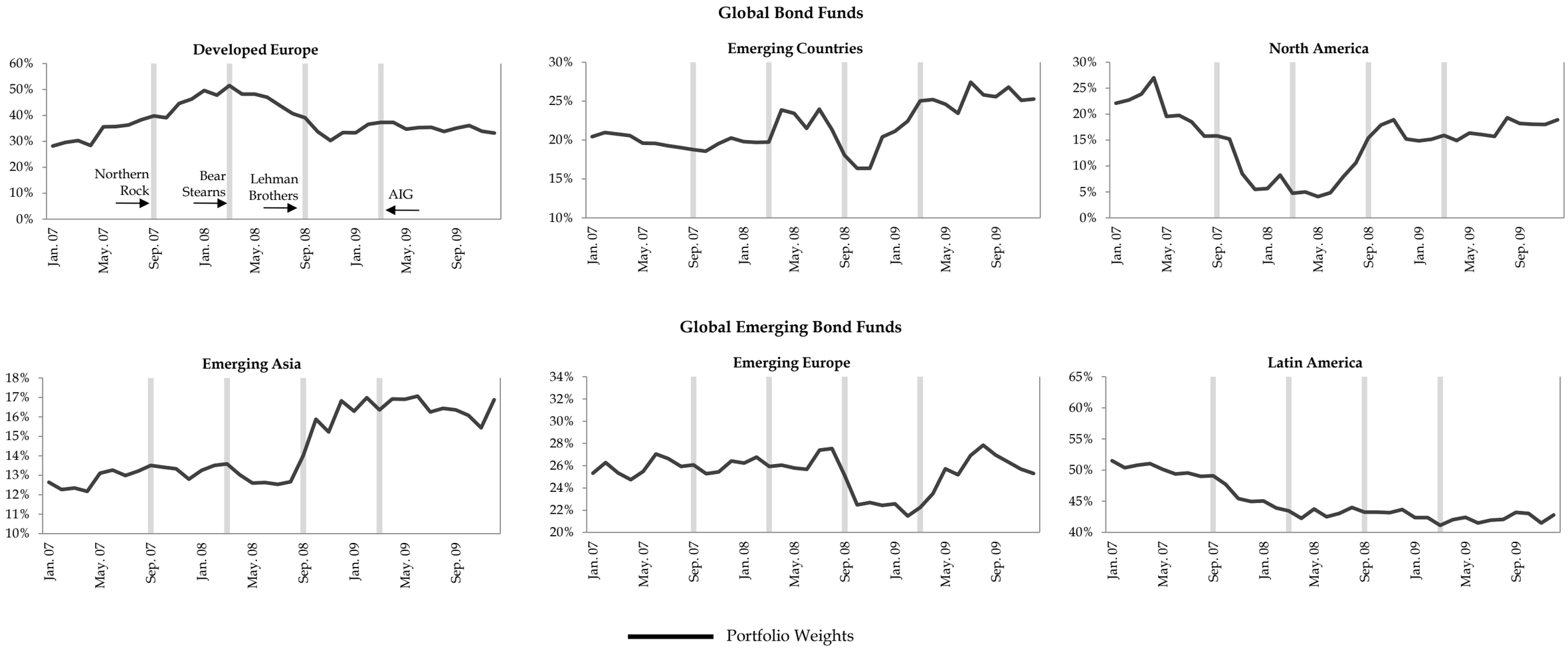


Figure 4
Cash Weights around the Global Financial Crisis

This figure presents the evolution of the average mutual fund portfolio weights in cash around the 2008 global financial crisis. Regions are aggregated according to the EPFR classification. Only funds that have complete coverage for the period under study (Jan. 2007 - Dec. 2009) are considered. The grey bars indicate times of stock market turmoil or the fall of financial institutions. In chronological order, they represent: the nationalization of Northern Rock (Sep. 2007), the Bear Stearns collapse (Mar. 2008), the Lehman Brothers collapse (Sep. 2008), and the AIG near-collapse (Mar. 2009).

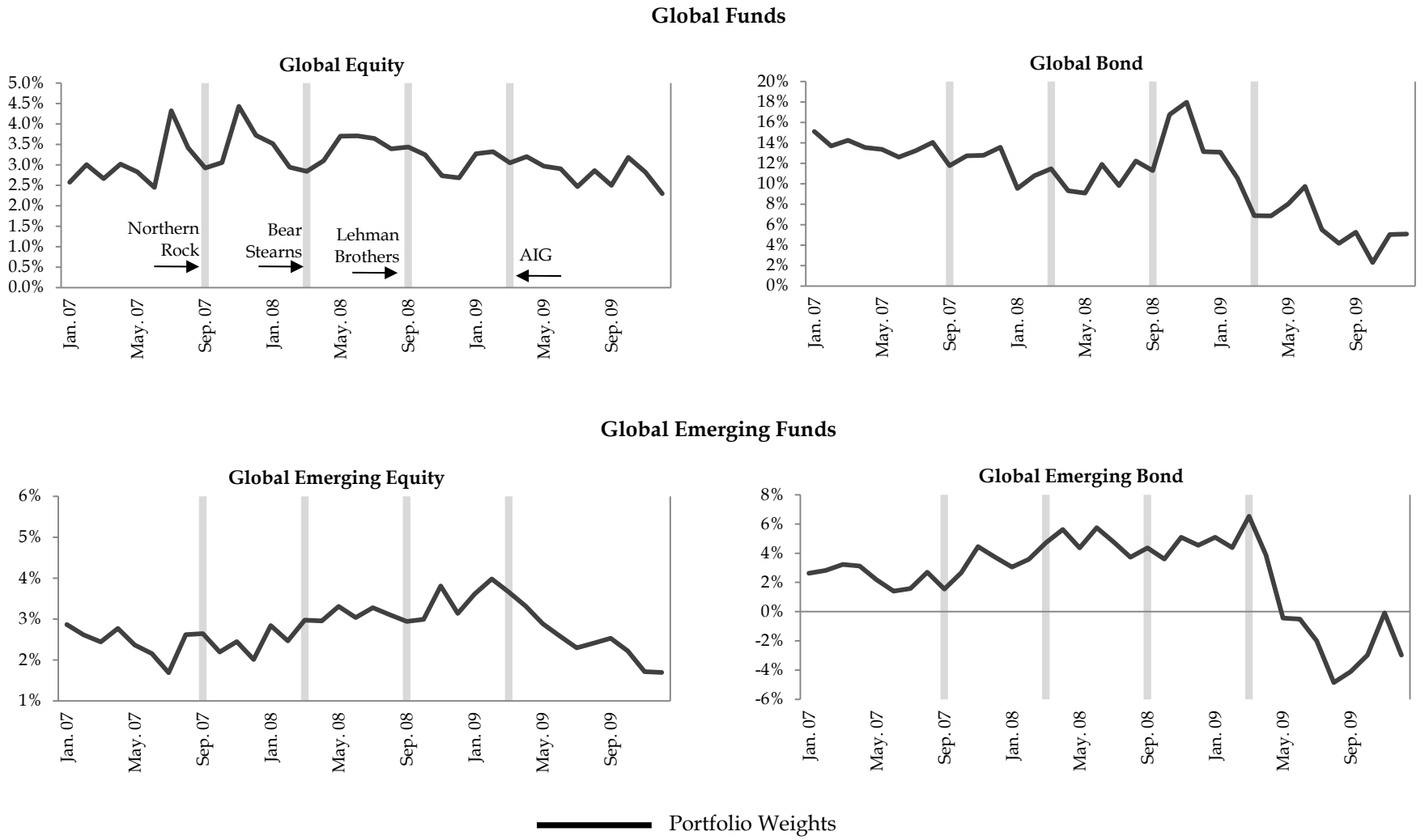


Figure 5
Mutual Funds' Median Growth Rate of Assets, Returns, and Injections

Panels A, B, and C present, respectively, the median growth rate of total assets, fund rate of return, and injections over initial assets for equity and bond funds. All variables are first calculated within funds, and then the median is obtained at each point in time considering only continuing funds. Shaded areas indicate times of global turmoil.

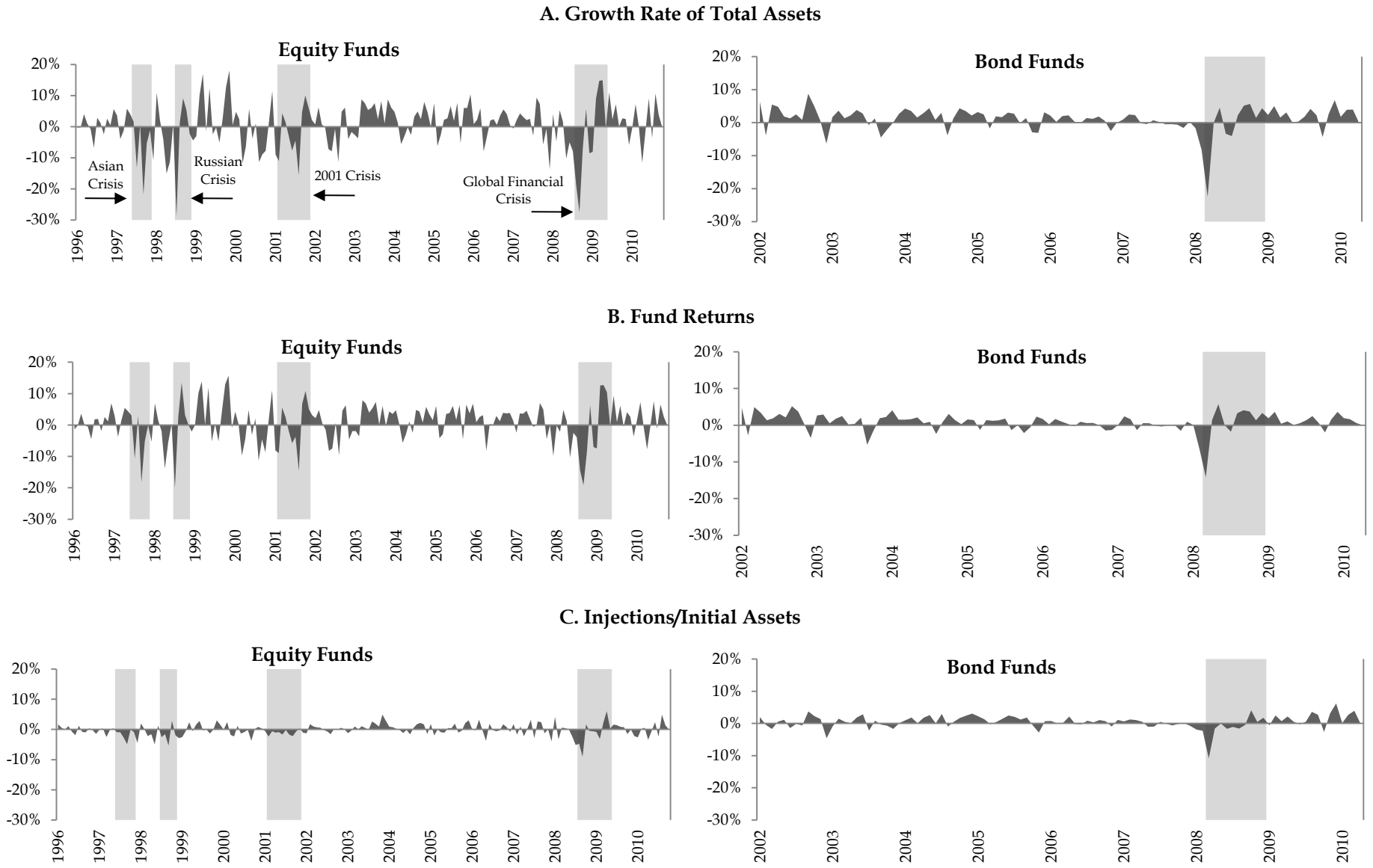


Table 1
Mutual Fund Summary Statistics

This table presents summary statistics on equity and bond mutual funds from the EPFR Global database. Panel A shows statistics across the whole sample. Column (1) presents the number of funds in each category. Column (2) presents the number of monthly observations among all funds within each category. Columns (3) and (4) present the first and last date, respectively, with available data in each category. Column (5) presents the median number of monthly reports within funds. Panel B presents the number of funds and observations by different partitions. Funds are divided by strategy, target region, and according to the country in which the fund is based. The strategy classification between active and passive is based on their investment behavior.

A. Whole Sample

	Number of Funds	Number of Observations (Fund-Month)	First Available Date	Last Available Date	Median Observations per Fund (Months)
	(1)	(2)	(3)	(4)	(5)
Equity Funds	965	54,940	Jan. 96	Nov. 10	47
Bond Funds	111	4,492	Jul. 02	Nov. 10	34

B. Number of Funds and Observations by Different Attributes

	Number of Funds	Number of Observations (Fund-Month)		Number of Funds	Number of Observations (Fund-Month)
	(1)	(2)		(1)	(2)
By Strategy					
Active Funds	1,025	58,383	Passive Funds	51	1,049
By Target Region					
Equity Funds			**Equity Funds**		
Asia Ex-Japan	201	13,365	Global Emerging	187	12,972
BRIC	18	610	Latin America	91	6,068
Emerging Europe, Middle East, and Africa	38	1,253	Pacific	41	2,442
Emerging Europe	91	6,580	**Bond Funds**		
Europe	143	4,824	Global	30	1,096
Global	155	6,826	Global Emerging	81	3,396
By Domicile					
Australia	5	167	Hong Kong	2	38
Austria	5	533	Ireland	104	5,571
Bahamas, The	3	56	Isle of Man	1	35
Bahrain	4	119	Japan	7	250
Belgium	5	295	Jersey	6	377
Bermuda	2	212	Luxembourg	400	21,528
British Virgin Islands	8	502	Mauritius	1	26
Canada	32	1,897	Netherlands Antilles	2	78
Cayman Islands	15	881	Netherlands	4	239
Denmark	22	1,063	Singapore	3	198
Finland	9	321	Sweden	1	30
France	22	1,328	Switzerland	19	1,298
Germany	22	634	United Kingdom	137	9,313
Guernsey	15	1,138	U.S.A.	220	11,305

Table 2
Mutual Funds' Growth Rate of Assets, Returns, and Injections

This table presents descriptive statistics of the growth rate of total assets, rate of return, and injections over initial assets in mutual funds, and the variance decomposition of the growth rate of assets. Panel A presents the mean, standard deviation, and variance decomposition for equity funds, and Panel B for bond funds. Columns (1) - (3) present the mean growth rate of assets, returns, and injections over initial assets. The reported values are obtained by calculating first the within-fund mean and then averaging across funds for each fund type. Column (4) is obtained by calculating the within-fund standard deviation and then averaging across funds for each fund type. Columns (5) and (6) are obtained by calculating the within-fund variance for the fund returns and injections over initial assets, and calculating their contribution to the variance of the growth rate of assets. Because the two terms are not orthogonal, the covariance term is imputed equally to each component.

A. Equity Funds

	Mean			Standard Deviation	Variance Decomposition	
	Growth Rate of Assets	Returns	Injections/ Initial Assets	Growth Rate of Assets	Returns	Injections/ Initial Assets
Fund Target Region	(1)	(2)	(3)	(4)	(5)	(6)
All Equity Funds	2.20%	1.01%	1.15%	10.34%	47.24%	52.76%
Asia Ex-Japan	2.44%	1.15%	1.24%	10.25%	41.12%	58.88%
BRIC	4.72%	1.33%	3.40%	13.82%	54.82%	45.18%
Emerging Europe, Middle East, and Africa	1.56%	-0.28%	1.86%	14.57%	33.26%	66.74%
Emerging Europe	2.81%	1.30%	1.35%	12.69%	48.22%	51.78%
Europe	0.65%	0.57%	0.11%	9.61%	38.39%	61.61%
Global	1.59%	0.71%	0.88%	6.96%	54.69%	45.31%
Global Emerging	2.85%	1.32%	1.46%	9.67%	49.57%	50.43%
Latin America	4.05%	1.61%	2.32%	13.11%	48.34%	51.66%
Pacific	1.05%	1.08%	-0.09%	7.98%	45.56%	54.44%

B. Bond Funds

	Mean			Standard Deviation	Variance Decomposition	
	Growth Rate of Assets	Returns	Injections/ Initial Assets	Growth Rate of Assets	Returns	Injections/ Initial Assets
Fund Target Region	(1)	(2)	(3)	(4)	(5)	(6)
All Bond Funds	3.94%	0.69%	3.19%	8.66%	11.37%	88.63%
Global	0.61%	0.31%	0.60%	7.39%	9.31%	90.69%
Global Emerging	1.31%	0.43%	0.92%	10.54%	9.74%	90.26%

Table 3
Variance Decomposition of the Growth Rate of Assets before and during the Global Financial Crisis

This figure reports the variance decomposition of the growth rate of assets before (tranquil times) and during the global financial crisis. Panels A and B report figures for equity funds and bond funds, respectively. Injections are obtained at the fund level, as the difference between the Total Net Assets (TNA) and the lagged TNA multiplied by returns. Columns (1) - (6) are obtained by computing the within-fund variance and then averaging across funds for the respective target region. Because the two terms are not orthogonal, the covariance term is imputed equally to each component.

A. Variance Decomposition for Equity Funds

Period	Before Global Financial Crisis (Jan. 2003 - Feb. 2007)		Global Financial Crisis "Narrow Window" (Mar. 2008 - Dec. 2009)		Global Financial Crisis "Wide Window" (Mar. 2007 - Oct. 2010)	
	Returns	Injections/ Initial Assets	Returns	Injections/ Initial Assets	Returns	Injections/ Initial Assets
Fund Target Region	(1)	(2)	(3)	(4)	(5)	(6)
All Equity Funds	36.74%	63.26%	67.01%	32.99%	57.65%	42.35%
Asia Ex-Japan	35.97%	64.03%	71.11%	28.89%	57.41%	42.59%
BRIC	41.53%	58.47%	72.15%	27.85%	61.45%	38.55%
Emerging Europe, Middle East, and Africa	17.47%	82.53%	60.51%	39.49%	52.81%	47.19%
Emerging Europe	40.07%	59.93%	69.37%	30.63%	63.54%	36.46%
Europe	19.98%	80.02%	51.33%	48.67%	44.36%	55.64%
Global	37.06%	62.94%	65.40%	34.60%	60.44%	39.56%
Global Emerging	33.54%	66.46%	70.15%	29.85%	64.71%	35.29%
Latin America	32.60%	67.40%	71.20%	28.80%	58.96%	41.04%
Pacific	37.38%	62.62%	65.15%	34.85%	58.90%	41.10%

B. Variance Decomposition for Bond Funds

Period	Before Global Financial Crisis (Jan. 2003 - Feb. 2007)		Global Financial Crisis "Narrow Window" (Mar. 2008 - Dec. 2009)		Global Financial Crisis "Wide Window" (Mar. 2007 - Oct. 2010)	
	Returns	Injections/ Initial Assets	Returns	Injections/ Initial Assets	Returns	Injections/ Initial Assets
Fund Target Region	(1)	(2)	(3)	(4)	(5)	(6)
All Bond Funds	12.36%	87.64%	18.78%	81.22%	11.82%	88.18%
Global	5.18%	94.82%	2.66%	97.34%	4.45%	95.55%
Global Emerging	12.90%	87.10%	26.23%	73.77%	20.59%	79.41%

Table 4
Determinants of Injections

This table presents the results of ordinary least squares (OLS) regressions of mutual fund injections over average assets on different variables at a monthly frequency. Panel A presents the results for equity funds and Panel B for bond funds. The "country crisis" variable is a dummy that indicates if a country has a banking, debt, or currency crisis during a given year. The dummy is weighted by the relative contribution of the country in the portfolio of a fund. The "global crisis" variable is a dummy variable that indicates periods of global crisis (Jul. 1997-Dec. 1997, Aug. 1998-Dec. 1998, Mar. 2001-Dec. 2001, and Sept. 2008-Jun. 2009). "Country of origin returns" are returns from the country index in the fund's domicile. Injections/average assets, lagged fund returns, and country of origin returns are all expressed as decimals. Fund fixed effects are included in all cases and, alternatively, fixed effects at the month and country of origin-month levels are included. The regressions are run with a constant, which is not reported. Standard errors (in parentheses) are clustered by country of origin and month. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

A. Equity Funds

	Injections/Average Assets						
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Country Crisis	-0.048 ***				-0.003	-0.009	-0.013
	(0.014)				(0.012)	(0.010)	(0.011)
Global Crisis		-0.018 ***			-0.008 **		
		(0.001)			(0.004)		
Lagged Fund Returns			0.161 ***		0.119 ***	0.171 ***	0.178 ***
			(0.024)		(0.023)	(0.033)	(0.039)
Country of Origin Returns				0.261 ***	0.222 ***	0.135 ***	
				(0.024)	(0.023)	(0.028)	
Fund Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	No	No	No	No	No	Yes	No
Country of Origin-Time Fixed Effects	No	No	No	No	No	No	Yes
Number of Observations	41,232	41,232	40,492	39,479	38,764	38,764	40,492
R-squared	0.035	0.036	0.047	0.050	0.065	0.114	0.174
Adjusted R-squared	0.016	0.017	0.028	0.031	0.046	0.092	0.090

B. Bond Funds

	Injections/Average Assets						
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Country Crisis	-0.081 ***				-0.070 ***	-0.018	-0.031
	(0.021)				(0.018)	(0.016)	(0.023)
Global Crisis		-0.038 ***			-0.028 ***		
		(0.006)			(0.008)		
Lagged Fund Returns			0.229 **		0.205 **	0.126 *	0.107
			(0.111)		(0.102)	(0.070)	(0.067)
Country of Origin Returns				0.464 ***	0.468 ***	0.337 ***	
				(0.148)	(0.127)	(0.121)	
Fund Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	No	No	No	No	No	Yes	No
Country of Origin-Month Fixed Effects	No	No	No	No	No	No	Yes
Number of Observations	3,520	3,520	3,445	3,261	3,196	3,196	3,445
R-squared	0.061	0.065	0.073	0.068	0.092	0.156	0.266
Adjusted R-squared	0.038	0.041	0.051	0.044	0.069	0.107	0.087

Table 5
Behavior of Log Country Weights

This table presents the results of ordinary least squares (OLS) regressions of log country weights on different variables. Panel A presents the results for equity funds and Panel B for bond funds. The "relative returns" variable is the difference between net country returns and net fund returns, expressed as a decimal. The "country crisis" variable is a dummy that indicates if a country has a banking, debt, or currency crisis during a given year. Estimations are performed at the different frequencies indicated in the table and including different combinations of fixed effects. Only countries in the relevant region are considered for each type of fund. Standard errors (in parentheses) are clustered by country of origin and time period. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

A. Equity Funds

	Log Country Weights							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables	Monthly						Semi Annual	Annual
Log Lagged Weights	0.986 ***	0.982 ***	0.983 ***	0.899 ***	0.901 ***	0.901 ***	0.568 ***	0.307 ***
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.012)	(0.026)
Relative Returns	0.622 ***	0.647 ***	0.993 ***	0.598 ***	0.959 ***	0.956 ***	0.857 ***	0.567 ***
	(0.051)	(0.057)	(0.013)	(0.049)	(0.013)	(0.013)	(0.032)	(0.035)
Country Crisis						-0.020 ***	-0.069 ***	-0.118 ***
						(0.003)	(0.017)	(0.026)
Fund Fixed Effects	No	Yes	No	No	No	No	No	No
Date Fixed Effects	No	Yes	No	No	No	No	No	No
Fund-Date Fixed Effects	No	No	Yes	No	Yes	Yes	Yes	Yes
Country of Destiny-Fund Fixed Effects	No	No	No	Yes	Yes	Yes	Yes	Yes
Number of Observations	458,458	458,458	458,458	458,458	458,458	458,458	62,949	26,018
R-squared	0.965	0.965	0.969	0.967	0.971	0.971	0.908	0.890

B. Bond Funds

	Log Country Weights							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables	Monthly						Semi Annual	Annual
Log Lagged Weights	0.974 ***	0.969 ***	0.970 ***	0.868 ***	0.866 ***	0.866 ***	0.448 ***	0.102 *
	(0.002)	(0.003)	(0.003)	(0.008)	(0.009)	(0.009)	(0.037)	(0.059)
Relative Returns	0.237 ***	0.238 ***	0.638 ***	0.219 ***	0.608 ***	0.611 ***	0.296 ***	0.310 ***
	(0.091)	(0.091)	(0.079)	(0.084)	(0.073)	(0.073)	(0.101)	(0.100)
Country Crisis						-0.016	-0.017	-0.026
						(0.011)	(0.050)	(0.084)
Fund Fixed Effects	No	Yes	No	No	No	No	No	No
Date Fixed Effects	No	Yes	No	No	No	No	No	No
Fund-Date Fixed Effects	No	No	Yes	No	Yes	Yes	Yes	Yes
Country of Destiny-Fund Fixed Effects	No	No	No	Yes	Yes	Yes	Yes	Yes
Number of Observations	39,183	39,183	39,183	39,183	39,183	39,183	5,035	1,959
R-squared	0.941	0.941	0.946	0.946	0.951	0.951	0.871	0.880

Table 6
Behavior of Country Weights

This table presents the results of ordinary least squares (OLS) regressions of country weights on different variables. Panel A presents the results for equity funds and Panel B for bond funds. The "buy-and-hold weight" variable is the lagged weight multiplied by the ratio of gross country return to gross fund return. The "relative returns" variable is the difference between net country returns and fund returns, expressed as a decimal. The "country crisis" variable is a dummy that indicates if a country has a banking, debt, or currency crisis during a given year. Estimations are performed at the different frequencies indicated in the table and including different combinations of fixed effects. Only countries in the relevant region are considered for each type of fund. Standard errors (in parentheses) are clustered by country of origin and time period. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

A. Equity Funds

	Country Weights (in %)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables	Monthly						Semi-Annual	Annual
Buy-and-Hold Weight (in %)	0.987 ***	0.984 ***	0.988 ***	0.893 ***	0.913 ***	0.913 ***	0.648 ***	0.461 ***
	(0.003)	(0.003)	(0.002)	(0.016)	(0.010)	(0.010)	(0.109)	(0.050)
Relative Returns	-1.782 ***	-1.619 ***	0.045	-1.512 ***	0.181 ***	0.173 ***	0.864 ***	1.011 ***
	(0.192)	(0.206)	(0.044)	(0.138)	(0.045)	(0.044)	(0.109)	(0.140)
Country Crisis						-0.093 ***	-0.371 ***	-0.602 ***
						(0.021)	(0.086)	(0.105)
Fund Fixed Effects	No	Yes	No	No	No	No	No	No
Date Fixed Effects	No	Yes	No	No	No	No	No	No
Fund-Date Fixed Effects	No	No	Yes	No	Yes	Yes	Yes	Yes
Country of Destiny-Fund Fixed Effects	No	No	No	Yes	Yes	Yes	Yes	Yes
Number of Observations	741,776	741,776	741,776	741,776	741,776	741,776	105,222	44,146
R-squared	0.982	0.982	0.985	0.984	0.986	0.986	0.951	0.935

B. Bond Funds

	Country Weights (in %)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables	Monthly						Semi-Annual	Annual
Buy-and-Hold Weight	0.971 ***	0.970 ***	0.971 ***	0.859 ***	0.861 ***	0.861 ***	0.440 ***	0.035
	(0.004)	(0.004)	(0.004)	(0.012)	(0.013)	(0.013)	(0.070)	(0.146)
Relative Returns	-1.563 ***	-1.540 ***	-1.053 ***	-1.359 ***	-0.917 ***	-0.914 ***	-0.120	0.905 *
	(0.184)	(0.187)	(0.273)	(0.168)	(0.234)	(0.234)	(0.283)	(0.529)
Country Crisis						-0.102 *	-0.340	-0.575
						(0.060)	(0.369)	(0.649)
Fund Fixed Effects	No	Yes	No	No	No	No	No	No
Date Fixed Effects	No	Yes	No	No	No	No	No	No
Fund-Date Fixed Effects	No	No	Yes	No	Yes	Yes	Yes	Yes
Country of Destiny-Fund Fixed Effects	No	No	No	Yes	Yes	Yes	Yes	Yes
Number of Observations	93,819	93,819	93,819	93,819	93,819	93,819	13,116	5,508
R-squared	0.961	0.961	0.962	0.964	0.965	0.965	0.891	0.871

Table 7
Behavior of Log Cash Weights

This table presents the results of ordinary least squares (OLS) regressions of the log cash weights on different variables. Panel A presents the results for equity funds and Panel B for bond funds. The "relative returns" variable is equal to minus fund net returns. The "country crisis" variable is a dummy that indicates if a country has a banking, debt, or currency crisis during a given year. The dummy is weighted by the relative contribution of the country in the fund's portfolio. The "global crisis" variable is a dummy variable that indicates periods of global crisis (Jul. 1997-Dec. 1997, Aug. 1998-Dec. 1998, Mar. 2001-Dec. 2001, and Sept. 2008-Jun. 2009). "Country of origin returns" are the returns from the country index in the fund domicile. Both relative returns and country of origin returns are expressed as decimals. Estimations are performed at the different frequencies indicated in the table and including different combinations of fixed effects. Standard errors (in parentheses) are clustered by country of origin and time period. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

A. Equity Funds

	Log Cash Weights					
	(1)	(2)	(3)	(4)	(5)	(6)
Variables	Monthly				Semi-Annual	Annual
Log Lagged Cash Weights	0.587 ***	0.389 ***	0.360 ***	0.377 ***	0.112 ***	-0.083
	(0.006)	(0.008)	(0.008)	(0.009)	(0.024)	(0.050)
Relative Returns	0.729 ***	0.700 ***	0.169 *	0.494 ***	0.188 ***	-0.181
	(0.083)	(0.102)	(0.088)	(0.099)	(0.071)	(0.138)
Country Crisis				0.096 *	0.116	0.498 *
				(0.051)	(0.158)	(0.284)
Global Crisis				0.158 ***	0.116 **	0.111
				(0.018)	(0.049)	(0.101)
Country of Origin Returns				-0.168	-0.437 ***	-0.034
				(0.116)	(0.097)	(0.119)
Fund Fixed Effects	No	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	No	No	Yes	No	No	No
Number of Observations	33,681	33,681	33,681	32,416	4,226	1,515
R-squared	0.347	0.433	0.452	0.434	0.435	0.523

B. Bond Funds

	Log Cash Weights					
	(1)	(2)	(3)	(4)	(5)	(6)
Variables	Monthly				Semi-Annual	Annual
Log Lagged Cash Weights	0.654 ***	0.449 ***	0.446 ***	0.433 ***	0.119	-0.380 **
	(0.022)	(0.029)	(0.029)	(0.030)	(0.078)	(0.176)
Relative Returns	-0.459 *	-0.422	-0.682	-0.381	0.166	0.510 *
	(0.264)	(0.303)	(0.456)	(0.298)	(0.257)	(0.295)
Country Crisis				-0.537 ***	-1.175 *	-1.923 *
				(0.172)	(0.670)	(1.057)
Global Crisis				-0.028	-0.039	0.371 *
				(0.047)	(0.138)	(0.186)
Country of Origin Returns				0.261	0.991	-0.362
				(0.520)	(0.949)	(0.930)
Fund Fixed Effects	No	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	No	No	Yes	No	No	No
Number of Observations	2,857	2,857	2,857	2,745	333	117
R-squared	0.437	0.510	0.532	0.507	0.528	0.660

Table 8
Decomposition of Gross and Net Flows by Region

This table presents the decomposition of gross and net flows into the growth rate of country weights and the growth rate of total mutual fund assets for different regions. Panel A presents the decomposition without adjusting the weights for returns, while in panel B weights are adjusted for returns. Shares are calculated as the median share of individual components for each country, averaged across time, and then averaged across all countries in each region. The variance decomposition is obtained by taking the variance of each individual component at the country level and then averaging it across countries. The country growth rate is computed as the sum of the two terms. Because the two terms are not orthogonal, the covariance term is imputed equally to each component. Outliers are filtered by the share of the first component associated with weights. Only observations within the 10th and 90th percentile of the share of the first component are used.

A. Gross Flows without Adjusting Weights for Returns

	Shares (% of Country Growth Rate)		**Variance Decomposition (% of Variance of Country Growth Rate)**	
Region	Growth Rate of Weights	Growth Rate of Fund Assets	Growth Rate of Weights	Growth Rate of Fund Assets
All Countries	46.5%	53.5%	59.0%	41.0%
Asia	40.5%	59.5%	55.9%	44.1%
Developed Countries	37.5%	62.5%	46.8%	53.2%
Developing Countries	64.3%	35.7%	78.8%	21.2%
Eastern Europe	47.7%	52.3%	65.5%	34.5%
Emerging Countries	36.1%	63.9%	49.8%	50.2%
Latin America	44.2%	55.8%	56.3%	43.7%

B. Net Flows Adjusting Weights for Returns

	Shares (% of Country Growth Rate)		**Variance Decomposition (% of Variance of Country Growth Rate)**	
Region	Return-Adjusted Growth Rate of Weights	Injections	Return-Adjusted Growth Rate of Weights	Injections
All Countries	88.4%	11.6%	84.8%	15.2%
Asia	91.6%	8.4%	84.6%	15.4%
Developed Countries	93.9%	6.1%	87.2%	12.8%
Developing Countries	89.9%	10.1%	91.3%	8.7%
Eastern Europe	85.0%	15.0%	86.3%	13.7%
Emerging Countries	79.9%	20.1%	74.2%	25.8%
Latin America	74.8%	25.2%	75.3%	24.7%

Table 9
Decomposition of Gross and Net Flows by Type and Frequency

This table presents the decomposition of gross and net flows into the growth rate of country weights and the growth rate of mutual fund assets by type and frequency. Panel A presents the decomposition without adjusting the weights for returns, while in panel B weights are adjusted for returns. Shares are calculated as the median share of individual components for each country, averaged across time, and then averaged across all countries in each region. The variance decomposition is obtained by taking the variance of each individual component at the country level and then averaging it across countries. The country growth rate is computed as the sum of the two terms. Because the two terms are not orthogonal, the covariance term is imputed equally to each component. Outliers are filtered by the share of the first component associated with weights. Only observations within the 10th and 90th percentile of the share of the first component are used.

A. Gross Flows without Adjusting Weights for Returns

	Shares (% of Country Growth Rate)		**Variance Decomposition (% of Variance of Country Growth Rate)**	
Type	Growth Rate of Weights	Growth Rate of Fund Assets	Growth Rate of Weights	Growth Rate of Fund Assets
Active	49.3%	50.7%	57.9%	42.1%
Passive	21.7%	78.3%	32.0%	68.0%
Equity	47.5%	52.5%	54.6%	45.4%
Bond	66.6%	33.4%	82.2%	17.8%
Frequency				
Monthly	46.5%	53.5%	59.0%	41.0%
Semi-Annual	33.7%	66.3%	40.7%	59.3%
Annual	26.2%	73.8%	35.2%	64.8%

B. Net Flows Adjusting Weights for Returns

	Shares (% of Country Growth Rate)		**Variance Decomposition (% of Variance of Country Growth Rate)**	
Type	Return-Adjusted Growth Rate of Weights	Injections	Return-Adjusted Growth Rate of Weights	Injections
Active	87.4%	12.6%	86.8%	13.2%
Passive	15.0%	85.0%	30.9%	69.1%
Equity	85.9%	14.1%	85.6%	14.4%
Bond	73.8%	26.2%	89.0%	11.0%
Frequency				
Monthly	88.4%	11.6%	84.8%	15.2%
Semi-Annual	83.3%	16.7%	78.9%	21.1%
Annual	80.6%	19.4%	73.0%	27.0%