Do Some Forms of Financial Flows Help Protect from Sudden Stops?

Andrei A. Levchenko and Paolo Mauro[1]

Abstract

There is a debate on whether some forms of financial flows offer better crisis protection than others. Using a large panel of advanced, emerging, and developing countries during 1970–2003, this paper analyzes the behavior of various types of flows: foreign direct investment (FDI), portfolio equity investment, portfolio debt investment, other flows to the official sector, other flows to banks, and other flows to the non-bank private sector. Differences across types of flows are limited with respect to volatility, persistence, cross-country comovement, and correlation with growth at home or in the world economy. However, consistent with conventional wisdom, FDI is found to be the least volatile form of financial flows when taking into account the average size of net or gross flows. The differences are striking during "sudden stops" in financial flows (defined as drops in total net financial inflows by more than 5 percentage points of GDP compared with the previous year): in such episodes, FDI is remarkably stable; similarly, portfolio equity seems to play a limited role; portfolio debt experiences a reversal, though it recovers relatively quickly; and other flows (including bank loans and trade credit) experience severe drops and often remain depressed for a few years.

The composition of a country's external liabilities—that is, the relative shares of foreign direct investment, portfolio equity, and external debt—may be an important determinant of its economic performance and vulnerability to crisis as a result of two possible types of mechanisms. First, the payments associated with some types of external liabilities have more desirable cyclical properties than those implied by others (Rogoff, 1999; Caballero and Cowan, 2006): with equity-like forms of finance, such as portfolio equity or foreign direct investment, payments are lower when economic performance is worse, whereas with debt contracts the same coupon payment is envisaged regardless of the state of the economy.[2] Equity finance thus makes it possible for domestic producers to share risk with foreign investors, thereby helping stabilize domestic consumption and improving domestic producers' ability to undertake riskier but more profitable projects. Second, some forms of flows may behave in a more desirable manner than others. For example, foreign direct investment has traditionally been viewed as more stable, and thus less likely to trigger financial crisis, than portfolio financial flows. At the same time, some empirical studies have cast doubt on the relevance of labels such as "short-term" and "long-term" flows for the volatility or predictability of financial flows (Claessens and others, 1995).

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[2] Moreover, in the event of an exchange rate crisis, foreign currency debt requires even greater payments in domestic currency terms, at a time when output usually declines. On the other hand, default or, for domestic currency debt, inflation, are ways in which the burden of debt can be reduced in bad times. In

(continued…)

While recognizing that the first mechanism—payments with desirable cyclical properties—is also of key importance, this paper focuses squarely on the second mechanism: the behavior of the various types of financial flows. This paper's objective is to provide the most detailed, comprehensive, and up-to-date exercise analyzing the behavior of various types of financial flows—especially for instances of sudden stops (defined as reversals in total financial flows by more than 5 percentage points of GDP compared with the previous year). Several previous studies have already considered some of the properties of at least some types of international financial flows. This paper will relate its findings to those obtained by other researchers.

The estimates presented below yield a somewhat mixed picture, suggesting that some, but not all, aspects of the conventional wisdom are confirmed by systematic empirical analysis. The key results are the following:

- Consistent with earlier results by Claessens and others (1995), the various types of financial flows do not seem to differ significantly with regard to persistence, procyclicality, responsiveness to G-7 growth or US interest rates, or comovement across emerging markets.

- Consistent with conventional wisdom, FDI is the least volatile form of financial flows, when taking into account the average size of net or gross flows. At the same time, changes in FDI flows account for a large portion of changes in overall

principle, greater procyclicality of payments can also be attained through appropriately designed financial instruments such as growth-indexed bonds (Borensztein and Mauro, 2004).

flows, reflecting FDI's importance as one of the largest sources of net flows to emerging and developing countries.

- The various types of flows behave very differently during sudden stops. FDI remains remarkably stable and plays essentially no role in sudden stops—an especially striking result considering that FDI represents a large share of total financial flows. Similarly, portfolio equity seems to play a limited role in sudden stops. Portfolio debt does experience a reversal, though it recovers relatively quickly after the sudden stop. Bank lending flows and official flows experience severe drops and often remain depressed for several years after sudden stops. Differences in the behavior of the various types of flow are primarily accounted for by gross inflows, rather than gross outflows.

A few previous studies have directly analyzed some aspects of the behavior of different types of financial flows, often focusing on important episodes.[3] Claessens and others (1995), in what is probably the most thorough analysis of stylized facts in this context, fail to find significant differences across types of flows. At the same time, Chuhan and others (1996) and the World Bank (1999) report evidence suggesting that FDI may be more resilient than short-term flows in response to financial disturbances; Sarno and Taylor (1999) find FDI to be more persistent than other types of flows; and Lipsey (2001)

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[3] Other studies have addressed complementary questions. Fernández-Arias and Hausmann (2001) consider the relationship between the composition of financial flows and the frequency of crises; they find that the share of FDI in total finance is associated with a lower frequency of crisis in developing countries, though they argue that the true underlying determinant of the likelihood of crisis is the currency denomination and maturity of liabilities. Faria and Mauro (2004) analyze the long-run determinants of the composition of countries' external liability structures, and find that institutional quality tends to be positively associated with the share of FDI and, especially, portfolio equity, in total liabilities.

shows that FDI was relatively stable in the crises affecting Latin America in 1982, Mexico in 1994, and East Asia in 1997. This paper updates and builds on such studies to gather a more comprehensive range of stylized facts, including an analysis of the behavior of financial flows in "sudden stop time," using an approach loosely analogous to that taken by event studies.

I. DATA DESCRIPTION

This paper analyzes 1970–2003 data on the financial account and six of its components: (i) *Foreign Direct Investment* (FDI); (ii) *Portfolio Debt Investment* (PDI); (iii) *Portfolio Equity Investment* (PEI); (iv) *Other Net Flows to the Domestic Official Sector* (the net flows arising from net purchases of foreign assets by the domestic monetary authorities and general government, and net purchases by foreign residents of liabilities issued by the domestic monetary authorities and general government); (v) *Other Net Flows to Domestic Banks* (the net flows arising from net purchases of foreign assets by domestic banks, and net purchases by foreign residents of liabilities issued by domestic banks); and (vi) *Other Net Flows to the Non-Bank Private Sector* (e.g. trade credits and bank flows to the non-bank private sector).[4] All flows are net, and reported in current U.S. dollars; the data are drawn from the IMF's Balance of Payments (BOP) database (Analytic Presentation, 5th edition of the *Balance of Payments Manual*). All flows exclude Exceptional Financing, Use of IMF credit, and Changes in Reserves. Throughout the analysis below, the flows are normalized by GDP in current U.S. dollars (taken primarily from the World Bank's World Development Indicators database, and

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[4] The sample period was chosen on the basis of data availability and quality.

supplemented with data from the IMF's World Economic Outlook database). All data

were checked for quality, dropping outliers and unusable observations. The full sample

includes 142 countries (Table 1), for which at least ten years of overall net financial

account data are available. Many countries, however, do not have data for some of the

subcomponents. The least coverage applies to portfolio equity investment, where data are

available—within the developing group—for only twelve countries. In light of these data

constraints, the sample of non-FDI flows to developing countries may not be

representative, implying that the results for that group should be treated with special

caution. The summary statistics presented below are based on annual data for 1970–2003;

all the main results hold for the subperiod 1990–2003. Similar patterns are also obtained

(not reported, for the sake of brevity) using quarterly data for a smaller sample of

countries.

Throughout the analysis, the focus is on net flows, rather than gross flows.

Indeed, sudden stops are a concept based on the net financial account, and crises and

financing difficulties ultimately result from changes in net flows. Recent papers (Faucette

and others, 2005; Rothenberg and Warnock, 2006) have suggested that gross flows

provide useful, policy-relevant information, and have asked whether abrupt declines in

net inflows are accounted for by the sudden retreat of global investors, or the "sudden

flight" of local investors. The standard focus on net flows is retained in this paper both

for consistency with the bulk of the literature on sudden stops and in order to investigate

the behavior of different types of flow in a broad range of countries, which data

constraints render difficult for gross flows. Nevertheless, the analysis of gross flows is

potentially fruitful, and results on gross flows are reported where sufficient data are

available. It is worth noting that the sudden stop sample used in the present paper—see below—overlaps with Rothenberg and Warnock's (2006) for nine episodes: all of them are classified by Rothenberg and Warnock (2006) as "true sudden stops" rather than "sudden flights."

II. BEHAVIOR OF DIFFERENT TYPES OF FINANCIAL FLOWS

This subsection reports results on simple summary statistics for the various types of flows (FDI, portfolio equity, portfolio debt, flows to the official sector, flows to banks, and flows to other economic agents)—including average net flows, volatility, correlations, persistence, and comovement—for three groups of countries: advanced, emerging, and developing (Table 2). Significant differences (at the 10 percent level) between such statistics across country groups are reported in bold, and significant differences across different types of flow (compared with FDI as the benchmark) are denoted by asterisks.

Average Net Flows

Considering the average financial account balance for each country in 1970–2003, and taking the cross-country median within each country group over the period, developing countries had the largest net inflows, followed by emerging markets, and then advanced countries (Table 2). This pattern is even more pronounced for FDI, which has not been a net source of finance for advanced countries. By contrast, emerging markets received net FDI inflows averaging about 1.3 percentage points of GDP yearly, and developing countries received about 1.9 percentage points. The results (not reported for the sake of brevity) are similar when considering 1990–2003 only, and suggest that the

relative importance of FDI as a source of net inflows for emerging and developing countries has, if anything, increased in the last decade.

Volatility

Two measures are used to gauge volatility. The first, the standard deviation, is most relevant when addressing questions where the size of the flow needs to be allowed to play a role: for example, "which types of flow account for the overall volatility of financial flows?" The second, the coefficient of variation (the standard deviation divided by the mean), is more informative when considering the nature of different types of flows, that is, when computing—say—the volatility of one dollar of a given type of flow. As shown below, several of the results hinge on the size of a given type of flow for different groups of countries.

Using the standard deviation of net flows (computed for each country, over 1970–2003) as a measure of volatility, financial flows are found to be substantially more volatile in emerging and developing countries.[5] The cross-country median of the standard deviation of the financial account balance is 2.7 percentage points of GDP for advanced countries, and almost twice as large for emerging markets and developing countries. This corroborates findings by previous studies (Broner and Rigobon, forthcoming; Prasad and others, 2003). The ranking by standard deviation is the same for FDI and other flows to the official sector. However, both PDI and PEI are 2 and 5 times more volatile in

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[5] Flows are normalized by GDP. The results are essentially identical when normalizing by trend GDP, suggesting that variation in flows is far greater than variation in GDP, and thus variation in the ratio of flows to GDP is accounted for primarily by variation in flows. It is also important to note that Levin, Lin and Chu (2002) panel stationarity tests convincingly reject the null hypothesis of a unit root, thus confirming that it is appropriate to compute the standard deviation of the flows to GDP ratios. Furthermore, the results are similar when considering the standard deviation of the change in the flows to GDP ratios.

advanced countries than in developing countries, respectively, with emerging market countries somewhere in-between. These differences are largely driven by the size of flows for the various country groups, and are no longer significant when using the coefficient of variation. Comparing across flows, FDI is the least volatile type of flow in advanced countries, with the exception of other flows to the official sector. For emerging markets, on the other hand, FDI is more volatile than PDI or PEI. For developing countries, other net flows to the official sector are the most volatile, followed closely by FDI.

When taking the size of the flows into account, however, the results on differences across flows for emerging markets and developing countries are reversed. In fact, based on the coefficient of variation, FDI is the most stable of all flows to emerging and developing countries (see also Wei, 2001): the (cross-country median) coefficient of variation for FDI is near 1, and is at least twice as large for each of the other types of flows; the difference compared with FDI is statistically significant for other flows to the official sector, other flows to banks, and other flows to the non-bank private sector.[6]

Correlations

Table 2 also reports correlations of financial flows with domestic GDP growth, G7 growth, and U.S. interest rates (the 1-year T-bill rate).[7] The coefficients of correlation between financial flows and these variables turn out to be quite small, except as noted

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[6] A possible problem with calculating the coefficient of variation is that average net inflows are often quite close to zero. Two alternative measures of relative volatility are used to check robustness: (i) the coefficient of variation for gross financial inflows and (ii) the standard deviation of net flows normalized by the average of gross flows. The conclusions are virtually the same.

below. Financial flows are mildly procyclical (with respect to domestic GDP growth) in emerging market and developing countries (see also Albuquerque and others, 2005). In developing countries, FDI displays the highest correlation with domestic growth, though the coefficient is still small at 0.2. For emerging markets, most procyclical are other flows to banks and other flows to the non-bank private sector. The only type of flow that exhibits significant correlation with G-7 growth is PEI for the developing countries (0.2). The U.S. interest rate is correlated with the inflows into advanced countries, with a coefficient of 0.2, and is virtually uncorrelated with the financial account of emerging and developing countries in the whole sample period, though that correlation is large in the 1980s (that is, a period characterized by relatively high interest rates and financing difficulties for emerging and developing countries in the aftermath of the debt crisis).[8] FDI is negatively correlated with the U.S. interest rate, in both emerging markets (correlation of -0.3) and developing countries (correlation of -0.2). Other studies, such as Fernández-Arias (1996), suggest—using higher frequency data for shorter time periods— that foreign interest rates do matter for financial flows. The present exercise finds that correlations with foreign interest rates are lower at the yearly frequency, a result also reported by Broner and Rigobon (forthcoming).

Persistence

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[7] The results are virtually unchanged using an average of U.S., Japanese, and German interest rates.

[8] More generally, note that the paper does not claim, on the basis of these simple correlations, to overturn the conventional wisdom that advanced country investors tend to supply more funds to emerging markets and developing countries when advanced country interest rates are low. The present paper simply reports that the various types of flow do not display significantly different correlations with respect to advanced country interest rates.

In order to investigate the persistence properties of financial flows, autoregressive coefficients were calculated on pooled data for each relevant country group, using a fixed effects regression with the first lag on the right-hand side.[9] The financial account balance is more persistent in advanced countries, with an autoregressive (AR(1)) coefficient of 0.7, higher than it is in emerging markets and developing countries, where the AR(1) coefficient is estimated at 0.5. For advanced countries, the AR(1) coefficient is also quite similar across flows, ranging between 0.3–0.4. For emerging markets, the most persistent type of flow is FDI, with an AR(1) coefficient of 0.5; and the least persistent is PDI, with a coefficient of virtually zero. For developing countries, FDI has an AR(1) coefficient of 0.35, with the coefficients for PDI, PEI, and other flows lying between 0.2–0.5. These estimates are close to those in Obstfeld and Taylor (2004) and Broner and Rigobon (forthcoming), though the latter find that total financial flows are more persistent in emerging and developing countries than in advanced countries.

Principal Components Analysis

This section analyzes the interrelationships of financial flows across income groups using principal components analysis, focusing on the share of variation explained by the first principal component—a standard measure of comovement—for each country group. The purpose here is to use comovement as a gauge for the relative importance of individual country factors versus factors that are common to all countries in a given group. As an example, suppose that the typical international investor treats all emerging markets as a group, but plays closer attention to individual country "fundamentals" in

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[9] As an alternative, AR(1) regressions are estimated for each country separately. The disadvantage of the pooled approach is that it constrains the AR(1) coefficient to be the same for each country group. The

advanced countries. Then the share of variation in capital flows explained by the common factor—the first principal component—would be higher for the emerging market group than for the advanced country group. Alternatively, suppose that portfolio flows are more prone to "contagion" than is FDI. In that case, the first principal component would account for a larger share of variation in portfolio flows than in FDI. Put another way, principal components analysis is a parsimonious way to summarize the degree of comovement among a group of several variables, in this case capital flows to a large group of countries.

Turning to the empirical findings, for total financial flows the patterns across developed and developing countries are quite similar, with the first principal component accounting for 25 to 30 percent of the variation in financial flows. Comparing across flows, FDI and PEI display the largest common component for advanced countries; for emerging markets, FDI has the largest common component; for developing countries, FDI, PDI, and PEI are roughly similar in this respect. The substantial degree of comovement of FDI compared with some other types of flows across emerging markets might be seen as somewhat surprising in light of the sensible prior that FDI is less likely to be affected by "contagion." However, this is consistent with the view that the fundamental determinants of FDI are likely to be correlated across emerging markets, particularly at the annual frequency. On the whole, the data seem to suggest that there are

advantage is that it allows for inclusion of countries for which only a short time series is available. The results obtained by performing the exercise country-by-country were similar to those reported here.

no pronounced differences across types of flow in the importance of the common component.[10]

Complementarities or Substitutabilities Among Different Types of Flows?

The correlation matrix among flows (Table 3) permits an assessment of complementarities or substitutabilities across the various kinds of financial flows.[11] Most types of flows are weakly negatively correlated or uncorrelated with each other. This pattern holds for all country groups, and is consistent with the results obtained by Claessens and others (1995). In a number of instances the correlations are significantly negative in a statistical sense—thus pointing to substitutability across flows. However, the evidence suggests that, from an economic standpoint, the correlations are rather small, as is the degree of substitutability. Moreover, reclassifications (say, between FDI and portfolio equity) may well be frequent and account for some of the observed negative correlations.

To recapitulate the evidence based on the summary statistics reported thus far, equity-like forms of finance seem relatively desirable because the payments they imply tend to be associated with the recipient country's ability to repay. In addition, although

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[10] Although Calvo and others (1993) find that the first principal component can account for 60 to 80 percent of variation in financial flows, their use of monthly data for a shorter time span (four years) on a Latin American sample may explain the difference in results. Albuquerque and others (2005) show that the share of variation in FDI that is attributable to global factors has increased dramatically over the past two decades. The use of annual data in the present paper implies that the time series is too short to provide reliable information on whether comovement has increased over time, or whether it is higher in periods of—say—relatively high global flows.

[11] To obtain the table, individual country series for each type of flow were first de-meaned by subtracting the country average for the flow, and then the correlation matrix was computed pooling the demeaned series for all countries. The results are confirmed by computing correlation matrices for each individual country, and taking the median correlations across countries.

the behavior of the various types of financial flow does not differ much in some important respects, FDI flows in particular seem relatively stable (when controlling for the size of the flows). As reported below, FDI flows are also strikingly impervious to sudden stops.

III. BEHAVIOR DURING SUDDEN STOPS IN FINANCIAL FLOWS

This section shows that differences in the behavior of the various types of financial flows become more pronounced during "sudden stop" events.

Defining Sudden Stops in Financial Flows

Definitions of sudden stops generally focus on large and rapid changes in financial flows.[12] The present study defines a sudden stop as a worsening in the financial account balance by more than 5 percentage points of GDP compared with the previous year. (The main results hold using alternative numerical thresholds.)

A key advantage of the definition used in the present study is its simplicity. It should be noted, however, that in a few cases countries maintain a positive financial balance even after a large and rapid worsening. These "sudden slowdowns" in inflows are kept as part of the list of sudden stops because, like other sudden stops, they require a decumulation of reserves or a reduction in the current account deficit. Another potential caveat is that in principle some sudden stops in financial inflows may be viewed primarily as the mirror image of improvements in the current account balance—especially windfall gains in exports revenues resulting from booms in commodity prices.

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[12] According to a bankers' saying, "it is not speed that kills, it is the sudden stop." See Dornbusch, Goldfajn and Valdés (1995).

Although the sample includes commodity exporters, none of the sudden stops analyzed seem to meet this description.

Alternative definitions of sudden stops are possible: for example, a decline in flows by more than two standard deviations, based on the individual country's distribution (Calvo, Izquierdo, and Mejia, 2004). Other things equal, however, a threshold based on percentage points of GDP will tend to identify more episodes in countries with volatile financial flows, whereas a threshold based on standard deviations will tend to identify a considerable number of episodes even for countries whose flows are stable by international standards. In an attempt to alleviate this problem, some studies use a combination of criteria, such as the 5 percentage point of GDP cutoff in combination with the change being greater than one standard deviation (Guidotti, Sturzenegger, and Villar, 2004). While such definitions are reasonable, this paper uses the simpler definition outlined above. The results are robust to changes in the sudden stop definition.

More generally, regardless of the exact definition, the interpretation of the results will depend on the direction of causality. Arguably, an intuitive and interesting question is which types of financial flows account for a sudden stop prompted by an exogenous fall in the supply to emerging markets, rather than a sudden stop caused by worsening expectations regarding a country's economic performance. While causality cannot be established definitively, inspection of growth forecast data since 1990 suggests that this paper's list of sudden stops does not include any obvious instances in which the stop was triggered by worsening growth expectations—as shown below.

Behavior of Different Types of Financial Flows Around Sudden Stops

The various types of financial flows display striking differences in behavior in

"sudden stop time," as evident in the sample of 33 sudden stop episodes in 1980–2002 for

which all six sub-components of the financial account are available for at least a 5-year

period around the sudden stop year (Figure 1). For each episode, the data are converted to

"sudden stop" time, with $t = 0$ being the year the sudden stop occurred. For each type of

financial flow, the cross-episode average (solid line) and standard error (that is, the

standard deviation divided by the number episodes—dotted lines) are computed. (The

data are first regressed on country and year dummies to remove country-specific means

and global developments from the data. The main results are largely unaffected by this

procedure.)

FDI plays almost no role in sudden stops in financial flows: it remains strikingly

stable, even though it represents a large share of total financial flows.[13] Similarly,

portfolio equity seems to play a limited role in sudden stops. Portfolio debt does

experience a reversal, though—on average—it recovers relatively quickly after sudden

stops. Other flows to the official sector, banks, and especially the non-bank private sector

experience severe drops, and remain depressed for a few years after sudden stops. These

differences are statistically significant. The drops in FDI and PEI during the year of the

sudden stop are significantly smaller than the drops in PDI, other flows to banks and

other flows to the non-bank private sector. Indeed, whereas the drops in FDI or PEI are

not statistically different from zero, the drops in all of the other categories are significant.

One might wonder whether the patterns displayed in Figure 1 vary depending on country characteristics such as the exchange rate regime or the degree of capital controls. For example, it is interesting to ask whether floating exchange rates might reduce the likelihood of excessive inflows that might subsequently be reversed in a sudden stop. Similarly, capital controls might tend to stabilize some types of flows more effectively than others. To address these issues, the sample was split into countries with fixed exchange rate regimes and those with flexible exchange rates.[14] The results (available upon request) show remarkably similar patterns for these two groups of countries. For capital controls, too few of the countries in the "sudden stop" sample had relatively liberal financial accounts to make a reliable comparison.

Replicating the analysis in Figure 1 for gross inflows and gross outflows (analogous charts are available from the authors upon request) shows that the results for gross inflows are strikingly similar to those reported in Figure 1, whereas the results for gross outflows show far more limited action. In other words, the patterns displayed in the figure are accounted for by differences in the behavior of gross inflows, whereas gross outflows do not seem to play an important role in this respect. Thus, in the terminology of Faucette and others (2005) and Rothenberg and Warnock (2006), this paper's sample seems to consist primarily of "true sudden stops" rather than "sudden flights," and such sudden stops are mainly accounted for by non-FDI inflows.

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[13] Section II.C discusses whether this result could be accounted for by "fire-sale FDI" (namely, FDI taking place in the aftermath of a crisis as cash-strapped domestic entrepreneurs sell to foreign investors who take advantage of the exchange rate devaluation).

[14] Fixed exchange rate regimes were those classified as 4 and above according to Reinhart and Rogoff's (2004) "fine" classification, supplemented by information drawn from the IMF's *Annual Report on Exchange Arrangement and Exchange Restrictions*.

An alternative way of gauging the role played by each type of (net) flow in sudden stops is to consider the number of instances in which a type of flow worsened by more than a given threshold (say, in percentage points of GDP) during sudden stop episodes (Table 4). Considering the 85 sudden stops for which data on *some* type of flow are available (top panel) and the 33 sudden stops (as in Figure 1) for which data on *all* types of flow are available (bottom panel) confirms that FDI plays a limited role in sudden stops, whereas "other flows" display more frequent large worsenings. Additionally, portfolio debt displays relatively frequent large drops, especially taking into consideration its relatively small size in normal times.

A similar message emerges when considering the response of different components of financial flows at the quarterly frequency around the Russian/LTCM crisis of August 1998, for all emerging market countries (see Figure 2, which—for the sake of brevity—only reports data for the countries whose financial account balance was most affected by the crisis.) Again, FDI (the dotted line) remains remarkably stable in all countries, despite major worsening of the financial account balance (the solid line) and net flows of portfolio debt, portfolio equity, and other flows. The advantages of analyzing the Russian/LTCM crisis and its aftermath are that it may be viewed as a genuinely exogenous "sudden stops" (an unexpected event, unlikely to have been triggered by simultaneously worsening expectations of growth or other fundamentals in many emerging markets); and that its consequences may be tracked for all emerging markets, without imposing any numerical cutoff on the size of the financial account reversal. At the same time, a disadvantage is that the initial nature of the shock, a default on debt

contracts, may have made it more likely to affect portfolio debt than other types of liabilities.

Interpretation

Causality and Timing

As mentioned above, the interpretation of the results regarding which components of financial flows account for sudden stops depends on the ultimate source of the sudden stop itself. If the sudden stop were driven by worsening expectations of economic growth, and if some types of flows were more closely related to growth prospects than others, then differences in resilience across types of flow in the face of sudden stops would arise naturally. If, instead, it were difficult to attribute sudden stops to changes in fundamentals in the countries affected, then one might be more willing to view some types of flows as more prone to reversals, regardless of the ultimate source of the shock.

While causality cannot be conclusively established, this section shows that, for most sudden stop episodes in the sample, there is no evidence that sudden stops were preceded by a worsening of expectations regarding economic growth. Beginning from the 33 sudden stop episodes listed in Figure 1, the analysis includes all 16 sudden stops for which monthly *Consensus Forecasts* of economic growth are available. Specifically, for each month of the year in which the sudden stop occurs, the *Consensus Forecast* of economic growth for the following year is considered. This is taken to be a reliable, summary measure of investors' expectations regarding economic "fundamentals" and prospects in the country in question.

As shown in Figure 3, for all sudden stop episodes, expectations of economic growth were buoyant or at least fairly positive at the beginning of the year in which the

sudden stop eventually occurred. Thus, a few months ahead of the sudden stop, expectations regarding economic "fundamentals" were strong. In general, it seems that expectations regarding economic fundamentals typically evolve in a gradual manner, and are unlikely to plummet abruptly in the absence of a shock—which seems to take the form of a sudden stop in financial flows in the cases depicted in the Figure.

The monthly profile of how the forecasts change during the year of the sudden stop is also consistent with the view that the sudden stop triggered the decline in forecast growth, rather than the other way around. In most cases where—based on information about financial flows or asset prices—the onset of the sudden stop in capital flows can be dated, there was no worsening in expected growth prior to the month when the sudden stop began.[15] Indeed, in most cases where the sudden stop was associated with an abrupt crisis reflected in the exchange rate or other asset prices, the *Consensus Forecast* growth began falling in a visible manner no earlier than the month during which the crisis erupted (Figure 3). In several cases, forecast growth declined only months after the exchange rate or other asset prices dropped. For the countries affected by the Asian crisis, forecast growth declined after the beginning of the crisis in Thailand (July 1997), that is, after the sudden stop had started. Similarly, for the countries affected by the Russian crisis, forecast growth declined only after the August 1998 crisis. (In Russia and the Ukraine, the worsening began a few months earlier.) In Mexico, forecast growth was strong and stable until the crisis struck (December 1994) and the same is largely the case

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[15] For all sudden stop episodes in countries for which quarterly data are available, the results are confirmed by analyzing quarterly data on financial flows—specifically, by identifying the first quarter when the sudden stop began, and checking that the preceding issue of the IMF's *World Economic Outlook* did not forecast a slowdown in economic growth for the country in question.

for Turkey (where the exchange rate fell sharply in January 2001). In Argentina, where the sudden stop occurred in 2001 (and 2002), forecast growth began declining in the summer of 2001, about half way through the first year or the sudden stop, though clearly prior to the full-blown crisis (December 2001-January 2002). For the remaining cases where it is difficult to associate the sudden stop with an easy-to-date crisis (Croatia, Czech Republic, Lithuania, Panama, Venezuela), growth expectations remain strong throughout the year of the sudden stop, except in the case of Venezuela, where forecast growth was about 2 percent at the beginning of the year of the sudden stop and declined rapidly during the year. On the whole, based on the patterns observed in the data it appears unlikely that sudden stops were caused by worsening country-specific fundamentals (with the notable exception of Argentina).

Fire-Sale FDI

Another potential concern is that perhaps a large portion of the resilience of FDI in the face of sudden stops might be accounted for by an increase in "fire-sale" FDI—a phenomenon for which existing evidence is based upon firm-level data regressions for a small set of Asian countries in the context of the 1997–98 crisis (Aguiar and Gopinath, 2005).[16] While it is difficult to gauge the exact macroeconomic relevance of fire-sale FDI, two sets of considerations are in order here. First, FDI rose after sudden stops in two Asian countries, Korea and Thailand, where growth expectations improved rapidly soon

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[16] "Fire-sale" FDI takes place in the aftermath of a crisis (typically involving a sharp currency depreciation), when foreign investors purchase domestic, cash-strapped firms at prices that tend to be below those based on long-run fundamentals.

after the crisis. In essentially all other cases in the sample, FDI remained strikingly stable. Occam's razor suggests that it would be unlikely for fire-sale FDI to match any decline in FDI so as to yield such exact stability in so many countries. Thus, it is an open question whether fire-sale FDI is a phenomenon of macroeconomic relevance in countries other than Korea and Thailand. Second, and more important, one might wonder whether FDI is failing to provide protection from sudden stops when domestic agents take a capital loss and then sell FDI (in a fire-sale) to foreign investors, who buy cheap assets in the aftermath of the crisis. Although it is true that domestic agents incur a capital loss in this case, a similar loss affects foreign investors who held FDI prior to the crisis. Moreover, as stated in the introduction, this paper focuses on the behavior of various types of flow, leaving the cyclical pattern of returns on the resulting stocks as a topic for further investigation.

IV. CONCLUSIONS AND POSSIBLE EXTENSIONS

There has been considerable interest in the question of whether some forms of external financing help protect emerging markets from volatility and, in particular, render sudden stops in external financial flows less likely or less damaging. Previous studies have drawn on important episodes or provided a partial analysis of stylized facts. This paper has sought to systematically document a thorough list of stylized facts on the behavior of various types of financial flows, and to focus on times of sudden stop, considering a large panel of advanced, emerging, and developing countries for 1970–2003. The evidence suggests that differences across types of flows are limited with respect to volatility, persistence, cross-country comovement, and correlation with growth at home or in the world economy. However, consistent with conventional wisdom, FDI is found to be the

least volatile form of financial flows when taking into account the average size of net or gross flows. The differences become striking during episodes of sudden stop: in such episodes, equity-like forms of financial flow and FDI in particular are very stable. Other flows, including portfolio debt flows and, to a greater extent, bank flows and trade credits, account for the sudden stops.

Although causal relationships in this context are difficult to establish, this analysis has sought to address issues of possible reverse causality that might affect the interpretation of the results, and has attempted to focus on the impact of sudden stops that were not clearly triggered by worsening expectations of economic performance in the countries under consideration. It has been shown that, in most cases, the sudden stops considered here were not preceded by expectations of low or worsening growth. Moreover, the results hold when considering the response of different components of financial flows at the quarterly frequency around the Russia/LTCM crisis of August 1998—an event that can be viewed as clearly exogenous to country-specific variables for most emerging markets.

While many possible extensions to the analysis could be considered, three potential extensions are worth highlighting. First, the analysis could be repeated controlling for the potential determinants of financial flows, and thus focusing on the residuals from panel regressions using alternative sets of potential explanatory variables (macroeconomic variables or even just—as a summary measure of fundamentals—growth forecasts). However, it seems unlikely that the main results would change, because fundamentals have little explanatory power for financial flows (Broner and Rigobon, forthcoming). Second, one could analyze the behavior of returns on the various

types of flows, showing that returns on equity-like forms of external liabilities (FDI and portfolio equity) are far lower than on debt-like liabilities in times of sudden stops. This would make it possible to measure the precise extent to which equity-like types of finance allow domestic producers to share risk with foreign investors. Third, moving to the consequences of financial flows, one could ask whether sudden stops in financial flows (and, more specifically, in non-FDI flows) have a large, adverse impact on the deviation of output from forecast output—suggestive evidence that the causal relationship goes from capital flows to output, rather than the other way around. These issues are left for further research.

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FIGURE 1. Composition of Financial Flows Around All Sudden Stops, 1980–2004
(In Percentage Points of GDP)

Financial Account

Foreign Direct Investment

Portfolio Debt

Portfolio Equity

Other Net Flows to Official Sector

Other Net Flows to Banks

Other Net Flows to Private Non-banking
Sector
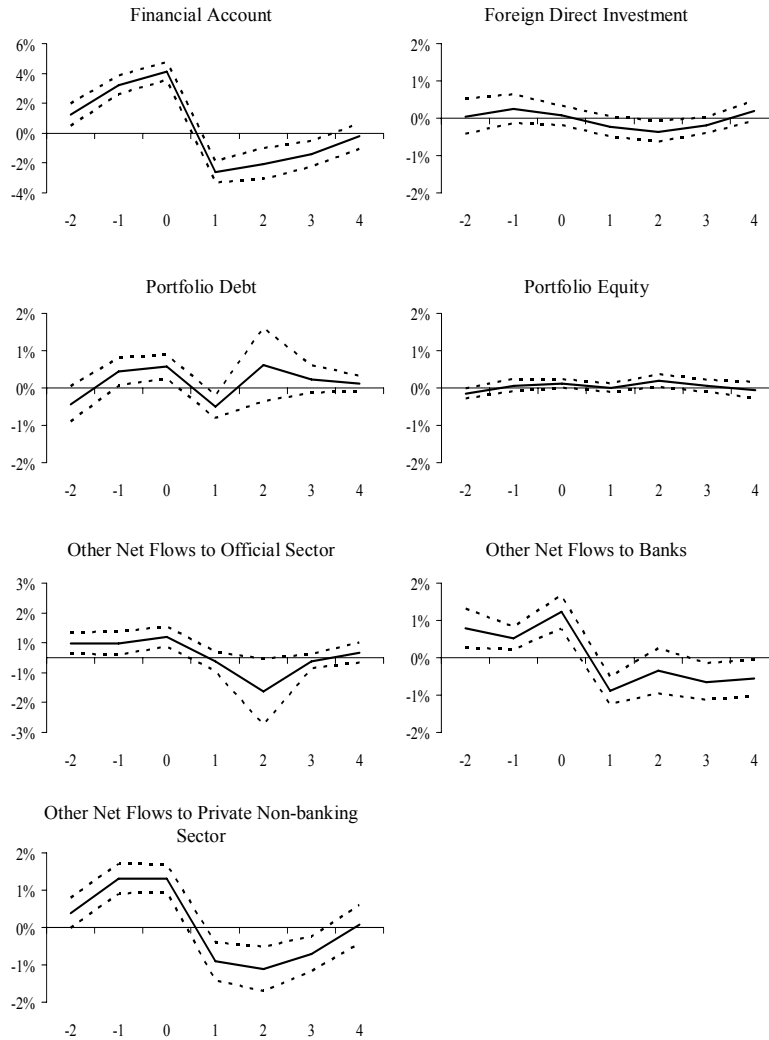
Source: IMF, *Balance of Payments Statistics* (analytic presentation).

Note: The behavior of different types of flows is illustrated in "sudden stop" time, with t=1 being the year
the sudden stop occurred. The solid line represents the average across episodes for each type of financial
flow. The dotted lines are one standard error bands for the cross-country distribution for the given year (in
event time) and type of flow. Sudden stops are reversals in the financial account by more than 5 percentage
points of GDP. The sample is restricted to instances in which all six sub-components of the financial
account are available for at least a 5-year period around the sudden stop year. The sample consists of 33
episodes: Argentina (2001); Barbados (1992, 2002); Brazil (1983); Chile (1991); Cote d'Ivoire (1983,
1996), Croatia (1998); Czech Republic (1996); Estonia (1998); Korea, Rep. (1997); Latvia (2000);
Lithuania (1999); Mauritius (2001); Mexico (1995); Namibia (1991, 1999); Panama (2000); Peru (1998);
Philippines (1997); Russian Federation (1998); Senegal (1982); Slovenia (1998); Swaziland (1993);
Thailand (1982, 1997); Togo (1992); Turkey (1994, 2001); Ukraine (1998); and Venezuela (1980, 1989,
2002). For each type of capital flow, the entire available sample of countries and years is first regressed on
a full set of country and year fixed effects to remove country-specific means and global developments from
the data. All flows exclude Exceptional Financing, Use of IMF credit, and changes in reserves.

FIGURE 2. Composition of Financial Flows Around the August 1998 Russia/LTCM Crisis
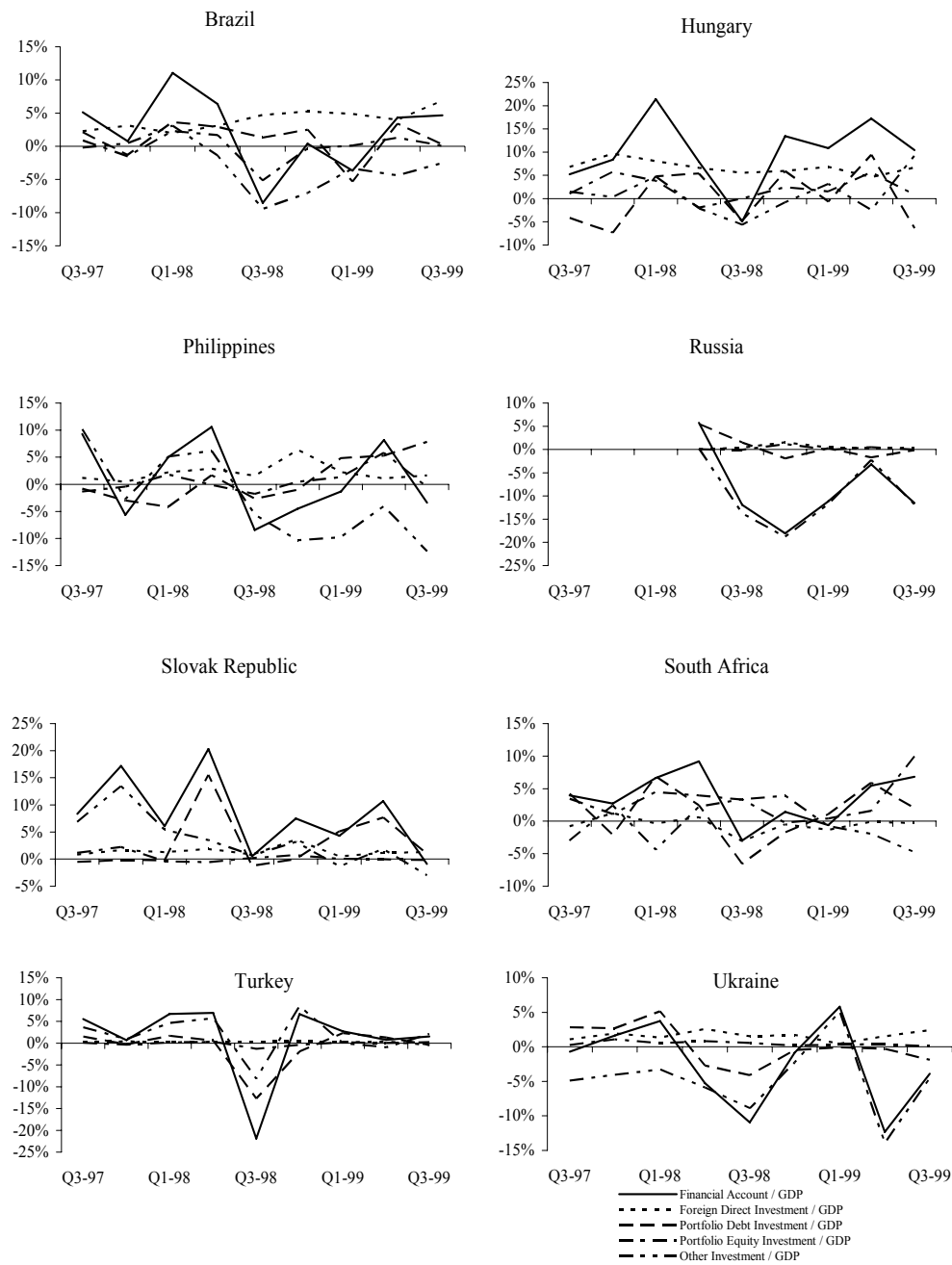
Source: IMF, *Balance of Payments Statistics*.
Note: "Other investments" in this chart includes bilateral official flows but excludes multilateral official flows.

FIGURE 3. Consensus Forecasts for the Following Year

Forecasts in 1994 for 1995 annual growth

Mexico (Crisis began in December 1994)

Month of forecast

Forecasts in 1996 for 1997 annual growth

Czech Republic (no specific event)

Month of forecast

Forecasts in 1997 for 1998 annual growth

Korea

Philippines

Crisis began in
Thailand in July →
1997

Thailand

Month of forecast

Forecasts in 1998 for 1999 annual growth

Peru

Croatia →

Estonia

Slovenia

Crisis began in
Russia in August →
1998

Ukraine

Russia

Month of forecast

Forecasts in 1999 for 2000 annual growth

Lithuania (no specific event)

Month of forecast

Forecasts in 2000 for 2001 annual growth

Turkey (exchange rate fell sharply in January

Panama (no specific event)

Month of forecast

Forecasts in 2001 for 2002 annual growth

Argentina (collapse of currency board
occurred in January 2002)

Month of forecast

Forecasts in 2002 for 2003 annual growth

← Venezuela (no specific event)

Month of forecast

Source: Consensus Forecasts

Table 1. Economies by Group

Advanced	Emerging	Developing	
Australia	Argentina	Albania	Kuwait
Austria	Brazil	Algeria	Kyrgyz Republic
Belgium-Luxembourg	Bulgaria	Angola	Lao's Peoples Dem. Rep.
Canada	Chile	Antigua and Barbuda	Latvia
Cyprus	China P.R. Mainland	Armenia	Lesotho
Denmark	Colombia	Aruba	Lithuania
Finland	Cote d'Ivoire	Bahamas The	Madagascar
France	Czech Republic	Bahrain Kingdom of	Malawi
Germany	Dominican Republic	Bangladesh	Maldives
Greece	Ecuador	Barbados	Mali
Iceland	Egypt	Belarus	Malta
Ireland	El Salvador	Belize	Mauritania
Israel	Hungary	Benin	Mauritius
Italy	India	Bolivia	Moldova
Japan	Indonesia	Botswana	Mongolia
Netherlands	Jordan	Burundi	Mozambique
New Zealand	Korea	Cambodia	Namibia
Norway	Malaysia	Cameroon	Nepal
Portugal	Mexico	Cape Verde	Netherlands Antilles
Singapore	Morocco	Central African Rep.	Nicaragua
Spain	Nigeria	Chad	Niger
Sweden	Oman	Comoros	Papua New Guinea
Switzerland	Pakistan	Congo Republic of	Paraguay
United Kingdom	Panama	Costa Rica	Romania
United States	Peru	Croatia	Rwanda
	Philippines	Dominica	Senegal
	Poland	Estonia	Seychelles
	Russia	Fiji	Sierra Leone
	Saudi Arabia	Gabon	Slovenia
	Slovak Republic	Gambia, The	Solomon Islands
	South Africa	Ghana	Swaziland
	Sri Lanka	Grenada	Syrian Arab. Republic
	Thailand	Guatemala	Tanzania
	Tunisia	Guinea	Togo
	Turkey	Guyana	Tonga
	Ukraine	Haiti	Trinidad and Tobago
	Uruguay	Honduras	Uganda
	Venezuela, Rep. Bol.	Jamaica	Vanuatu
	Zimbabwe	Kenya	Vietnam

Note: Advanced countries are defined as in the IMF's *World Economic Outlook*, except for Korea which for the purpose of the empirical analysis is classified as an emerging market rather than advanced to capture the experience of its 1997–98 crisis; the remaining countries are considered emerging markets if they are included in either the (stock market based) International Financial Corporation's Major Index (2005) or JPMorgan's EMBI Global Index (2005) (which includes countries that issue bonds on international markets); the remaining countries are classified as developing.

Table 2. Financial Account and its Sub-Components, 1970–2003

	Financial account	FDI	PDI	PEI	Flows to Official	Flows to Banks	Flows to Other
Average of Capital Flows							
Advanced	**1.38**	**-0.02**	0.25	-0.34	**0.02**	**0.42**	0.04
Emerging	**1.89**	**1.30**	0.17*	0.15*	**0.10***	**0.01***	0.04*
Developing	**2.98**	**1.88**	-0.10*	0.13*	**0.86***	**-0.13***	0.38*
Standard Deviation							
Advanced	**2.72**	**1.31**	**2.09***	**1.51**	**0.88**	**2.30***	1.77
Emerging	**4.39**	**1.50**	**1.08**	**0.55***	**1.89***	**1.32**	1.95*
Developing	**4.86**	**2.08**	**0.95***	**0.35***	**2.21**	**1.14***	1.93
Coefficient of Variation							
Advanced	1.37	**2.20**	3.07	3.18	2.66	5.54	**5.39**
Emerging	1.88	**1.00**	3.51	1.98	3.16*	7.22*	**3.61***
Correlation with Domestic Growth							
Advanced	0.10	**0.00**	0.00	0.02	-0.01	**0.18***	**0.04**
Emerging	0.24	**0.10**	-0.02*	0.07	-0.002*	**0.15**	**0.22**
Developing	0.16	**0.17**	-0.08*	0.14	-0.01*	**0.04***	**0.14**
Correlation with G7 Growth							
Advanced	**-0.01**	**0.03**	-0.08	**0.05**	-0.03	**0.09**	-0.06
Emerging	**-0.08**	**-0.07**	-0.06	**0.04**	-0.01	**-0.07**	-0.07
Developing	**0.01**	**0.04**	0.01	**0.24***	0.00	**-0.03**	0.03
Correlation with US 1 year Tbill							
Advanced	0.23	**0.08**	0.07	0.10	0.03	0.03	0.15
Emerging	0.07	**-0.29**	-0.07	-0.08*	0.27*	0.03*	0.13*
Developing	0.10	**-0.16**	0.05*	0.14*	0.20*	0.04	0.07*
Persistence (AR1 Pooled)							
Advanced	**0.68**	**0.33**	**0.35**	0.37	0.40	**0.37**	**0.41**
Emerging	**0.52**	**0.51**	**0.02***	0.39	0.42*	**0.12***	**0.47**
Developing	**0.51**	**0.35**	**0.51***	0.41	0.49*	**0.17***	**0.37**
First Principal Component							
Advanced	0.30	0.36	0.23	0.37	0.20	0.27	0.19*
Emerging	0.24	0.40	0.28	0.34	0.25*	0.19*	0.21*
Developing	0.28	0.32	0.36	0.35	0.27	0.17*	0.18*

Sources: IMF, *Balance of Payments Statistics* (all financial flows); World Bank, *World Development Indicators* and IMF, *World Economic Outlook* (GDP). See the text for details.

Notes: All statistics (except persistence and the share of variation accounted for by the first principal component) are computed for each country over 1970–2003. The data reported are medians across countries within each group. All flows are net and normalized by total GDP for each year. Stars indicate that the flow is statistically significant from FDI in that country group. Columns in bold are those in which the property of the flows is different across country groups. The coefficient of variation of a series is the standard deviation divided by the mean: it is computed for each country separately, and this table reports the median across countries. The measure of persistence for each variable is the slope coefficient in a panel (fixed effects) regression of the variable of interest on its lagged value. The share of variation accounted for by the first principal component is a measure of comovement across countries within each group: it is the share of total variation in a set of series that can be explained by a common component.

Table 3. Correlations Among Flows, 1970–2003

	FDI	PDI	PEI	Flows to Official	Flow to Banks
PDI	-0.09*				
PEI	-0.12*	-0.16*			
Flows to Official	-0.07*	-0.14*	-0.01		
Flow to Banks	-0.02	-0.25*	-0.23*	0.02	
Flows to Other	-0.05*	0.03	0.14*	0.001	0.02

Sources: IMF, *Balance of Payments Statistics* (all financial flows); World Bank, *World Development Indicators* and IMF, *World Economic Outlook* (GDP). See the text for details.
Notes: This table reports the correlation matrix among the types of flows. Asterisks indicate correlations that are statistically different from zero at the 10% level.

Table 4. Number of Large Worsenings During Sudden Stops, by Flow Type

	Number of large worsenings of given flow type out of 85 sudden stops (thresholds in percentage points of GDP).				
	1 p.p. change	2 p.p. change	3 p.p. change	4 p.p. change	5 p.p. change
out of 85 sudden stops					
Foreign Direct Investment	33	18	13	10	8
Portfolio Debt Investment	21	16	10	6	5
Portfolio Equity Investment	7	2	1	0	0
Other Investments	79	75	73	67	60
out of 33 sudden stops					
Foreign Direct Investment	13	9	5	2	2
Portfolio Debt Investment	18	15	9	6	5
Portfolio Equity Investment	6	1	1	0	0
Other Investments	29	29	26	20	15

 Sources: IMF, *Balance of Payments Statistics* (all financial flows); World Bank, *World Development Indicators* and IMF, *World Economic Outlook* (GDP). See the text for details.
Notes: The table considers sudden stops defined as episodes when the financial account worsens by more than 5 percentage points of GDP. The top panel considers the 85 sudden stops for which data are available for *some* type of flow. The bottom panel considers the 33 sudden stops for which data are available for *all* types of flow. Within these sudden stop episodes defined as above, the table reports the number of instances in which each flow type fell by more than a given number of percentage points of GDP, as indicated. Thus, there will often be instances in which more than one type of investment falls by more than the indicated benchmark. For the sake of brevity, this table aggregates "flows to official," "flows to banks," and "flows to other" from the previous figures and tables into "other investments."