Financial Diversification, Sudden Stops, and Sudden Starts

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The financial crises of the second half of the 1990s have led to renewed interest in the causes and consequences of international capital flows. Sudden stops, defined as large drops in net capital inflows, have received particular attention, given the collapses in output and investment commonly associated with these events.[1]

The premise in most of the recent literature on sudden stops is that emerging market economies are exposed to large fluctuations in the supply of international capital, as a result of imperfections in international financial markets (see Calvo, Izquierdo, and Mejía, 2004; Guidotti, Sturzenegger, and Villar, 2004; Frankel and Cavallo, 2004). In this literature, Wall Street is either the carrier of financial contagion or the originator of the shock itself. The origin of the stop in capital inflows is not a shift in either the mean or variance of the marginal productivity in the domestic economy, but rather a change

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1. Edwards (2004) finds that the current account reversals associated with sudden stops lead to a decline in GDP growth of approximately 4 percent. Other estimates of the cost of sudden stops are presented in Guidotti, Sturzenegger, and Villar (2004).

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in the willingness of foreign savers to invest in the domestic economy. In sudden stop episodes, net capital inflows are drastically curtailed, forcing the domestic economy to adjust via some combination of expenditure reduction and expenditure switching, a real exchange rate depreciation, and falling output.

The existence of these imperfections—usually stemming from informational asymmetries—is certainly plausible, and it has recently received considerable empirical support.[2] However, an identification problem makes it difficult to gauge just how important these factors are in explaining the sudden stops to net capital flows that have been observed in recent years. For a start, in the absence of a massive reserve accumulation and drawdown, the balance in the current account will move almost one to one with the balance in the capital account, making it impossible to determine whether the sudden stops are capital account developments or domestic savings-investment movements. Moreover, even when the sudden stop originates in the capital account, it could be driven by a sudden stop of gross capital inflows by foreigners (capital inflows) or by the decision of domestic agents to invest abroad (capital outflows).

Identifying the relative importance of the different underlying shocks causing sudden stops has key policy implications. If the main source of capital account volatility is shocks to capital inflows, then vulnerability to external financial shocks becomes a central policy issue.[3] On the other hand, a sudden stop in the capital account could simply reflect changes in savings and investment, which lead to balancing the current account after a period of persistent deficits as emphasized in the literature on current account reversals (Milesi-Ferretti and Razin, 1998). This could be expected from an economy after years of rapid expansion, where the current account deficit contributes to the financing of high investment rates, or the result of an

2. The role of international financial markets in contagion is evident in the transmission of shocks from a crisis country to one belonging to the same asset class (Rigobon, 2001), borrowing from the same international banks (van Rijckeghem and Weder, 2000), or sharing a set of overexposed mutual funds (Broner and Gelos, 2003). Evidence of international financial markets as a source of instability can be found in the recent literature that explores the role of risk premiums on emerging market bonds spreads in developed capital markets (García-Herrero and Ortiz, 2006; Daude and Ramos-Ballester, 2006).

3. Holding international reserves as a means of self-insuring against sudden stops is one example of the type of policy being adopted by emerging market economies; see Calvo (2005); García and Soto (2006); Jeanne and Rancière (2006); Caballero and Cowan (2006). The use of contingent instruments that provide flows offsetting these sudden stops is a second example (Caballero and Panageas, 2005).

improvement in the terms of trade. Alternatively, the current account reversal could be the result of policy mismanagements. For example, it might be triggered by an exchange rate misalignment, which could result in an unsustainable expansion of expenditure followed by a currency crisis and a curtailment in foreign financing. In this latter case, rather than pursuing a strategy of insurance, authorities should concentrate mainly on avoiding policies that can become a source of shocks, as emphasized in much of the crisis literature prior to the Mexican and Asian crises. Finally, understanding the causes and optimal responses to portfolio shifts by domestic agents leads to a third (and less understood) set of policy issues.

Unfortunately for the policymaker, the jury is still divided as to the relative role of fundamentals and external financial factors in explaining recent crises. The Asian financial crisis is a clear example, with two opposing sets of explanations. One view is that excessive reliance on short-term external debt left Asian emerging market economies vulnerable to shocks (and panics) from international financial markets.[4] The alternative view is that the Asian financial crisis largely reflected policy distortions in the region, in particular distortions that led to excessive (mainly short-term), borrowing by corporations and excessive lending by domestic banks (Corsetti, Pesenti, and Roubini, 1999). A second example is the range of explanations for current account fluctuations in emerging market economies. Aguiar and Gopinath (in this volume) emphasize the time series patterns of productivity in emerging market economies to explain the current account anomalies documented in these countries, whereas Guajardo (in this volume) focuses on the role of financial frictions.[5]

The central theme of this paper is that additional information on the characteristics of international adjustments can be obtained by breaking net capital inflows into capital inflows (which correspond to the changes in the stocks of international liabilities of domestic residents) and outflows (which measure changes in the stocks of international assets of domestic residents).[6] The key assumption is

4. Furman and Stiglitz (1998); Radelet and Sachs (1998); Chang and Velasco (1998).

5. See also Aguiar and Gopinath (2007) and Neumeyer and Perri (2005).

6. A small but growing literature explores gross capital flows and capital account reversals. Faucette, Rothenberg, and Warnock (2005) separate capital account reversals into outflow- and inflow-induced shares, arguing that only the former correspond to sudden stops. Cowan and De Gregorio (2006) focus on the behavior of gross capital flows to Chile in the 1998 capital account reversal. Finally, Rothenberg and Warnock (2007) follow a route similar to ours (see section 1, below) by looking at sudden stops caused by a large drop in inflows.

that the returns expected from international liabilities are driven by the shocks in international markets discussed above, whereas gross international assets are not directly affected by these variables. We can therefore use the relative variance and covariance of gross inflows and outflows to obtain information on the structure of shocks hitting both emerging and developed economies.

We use gross flows to study two closely related issues: the role played by reversals of inflows in recent sudden stops and the overall pattern of gross inflows and outflows across emerging and developed economies.[7] Specifically, the first section of the paper focuses on sudden stops, separating them according to the importance of gross inflows in the overall reversal of net capital flows.[8] We find that one in five sudden stops corresponds to surges in capital outflows (sudden starts) rather than stops in inflows. This suggests that the importance of external financial shocks has been overestimated in the literature, with implications for optimal reserve management, the design of state contingent instruments, and so forth. We also find that the distinction between varieties of sudden stops matters: sudden starts are associated with smaller drops in output and investment than inflow-driven sudden stops. Finally, we show that the probability of experiencing a sudden start (conditional on a sudden stop) is higher in economies that have more developed domestic financial systems and are more open to trade. Although not conclusive, this last finding suggests an alternative explanation for the fact that the output cost of sudden stops (or current account reversals) is smaller for more open economies (see Edwards, 2004; Guidotti, Sturzenegger, and Villar, 2004).

Next, the paper looks at inflow reversals and discusses the degree of coincidence between these and the sudden stop episodes identified in the literature. The main finding is that large inflow reversals are prevalent in both emerging and developed economies, but a much smaller share of them coincide with sudden stops in developed countries because of offsetting changes in outflows.

Whereas the first part of the paper, section 1, concentrates on the lower tail of the distribution of changes in the net capital account (and

7. The former objective is motivated by the finding, reported in Cowan and De Gregorio (2006), that the Chilean sudden stop of 1998 was atypical of sudden stops in Latin America in the 1990s, as it was almost completely driven by a surge in capital outflows instead of an abrupt reduction in inflows.

8. Throughout the paper, we refer to large drops in net capital flows as sudden stops. In doing so, we follow the literature without judging the appropriateness of the expression, although it may be misleading, as should be clear from our discussion.

gross inflows), the second part, section 2, characterizes capital flows in general. Not surprisingly, we find that emerging market economies have more volatile capital accounts than developed economies. This higher variance is not the result of more volatile capital inflows to emerging market economies, however, since the volatility of gross inflows is remarkably similar across country groups. Rather, it reflects a higher covariance between inflows and outflows in developed countries. This is the continuous counterpart to the finding that reversals of the capital account are highly correlated with stops to inflows in emerging market economies but not in developed countries. Indeed, we find that the correlation between gross inflows and outflows decreases with per capita income and financial integration.

A simple conceptual framework provides a possible explanation for this empirical finding. We argue that sudden stops to inflows are prevalent in international financial markets, and that international assets holdings by residents provide the first line of defense against these non-fundamental-driven shocks to capital flows. The key price variable is the expected return in the domestic economy. Drops in inflows must push up domestic returns if domestic assets invested abroad are to return to the domestic economy. An economy's ability to absorb shocks to capital inflows will depend on its level of financial development (which will affect the interest rate response) and the stock of gross international assets (which places bounds on the size of the shock that can be absorbed). Arguably, developed economies are better prepared to face financial shocks along both dimensions. The second line of defense is provided by productive assets, capable of generating export revenues that offset the inflows. This is the role of the tradables sector in the Calvo, Izquierdo, and Mejía (2004) model. The key price variable for this second line of defense is the real exchange rate.

This interpretation of the stylized facts on gross capital flows has several policy implications. The first relates directly to the current debate on global imbalances. Our results suggest that when shocks to the demand for U.S. assets arising from the portfolio decisions of foreign investors are not accompanied by changes in U.S. returns, they will be offset by shifts in U.S. foreign asset positions. The United States will not have to adjust its current account, and the impact on output will be small. The flip side is that countries outside the United States will experience a sudden stop to inflows from U.S. investors, leading to an unwinding of gross international asset positions in economies with gross asset positions and a capital account reversal

in poorer economies. The second policy implication is that in setting optimal reserve and contingent asset policies, governments need to take into consideration both the total foreign asset positions of the private sector and the level of development of the domestic financial system before deciding the optimal level of coverage against external financing shocks. The importance of the financial system stems from the fact that foreign assets and liabilities are not likely to be held by the same agents in the economy, so they will need to be redistributed in times of distress. Financial underdevelopment will therefore distort the decision to save abroad in the first place, and it will then distort the decision to repatriate assets in case of a sudden stop.

A second key issue is to correctly separate external financing shocks from shocks to the domestic marginal product of capital when determining the optimal reserve strategy. When faced by a productivity shock, pumping reserves into the domestic economy will simply lead to larger outflows (and rich speculators).

The rest of the paper proceeds as follows. Section 1 discusses sudden stops and the role played by inflows and outflows. Section 2 describes the main stylized facts characterizing gross and net capital flows to developed and emerging market economies. It also presents a simple model to interpret the facts. Finally, section 3 concludes.

1. Sudden Stops and Sudden Starts

This section classifies sudden stop episodes according to the relative importance of rising gross capital outflows and falling gross inflows. It also looks at large reversals in gross capital inflows and categorizes them according to their coincidence with sudden stops. The section starts with a brief description of the data and definitions used, before presenting and discussing the main results.

1.1 Data and Definitions

Following balance-of-payment conventions, we define capital inflows as changes in the stock of international liabilities owed by domestic residents. These liabilities include equity (foreign direct investment and portfolio), bonded debt held by nonresidents, and loans from nonresident banks. Since they are changes in stocks, inflows can either be positive (a capital inflow) or negative (a reversal). Capital outflows, in turn, are changes in the foreign assets of domestic residents. International assets include offshore foreign

direct investment (FDI), foreign equity and bonds held by resident, and loans to nonresidents (or offshore deposits). The capital account is simply the sum of net inflows (negative) and net outflows (positive). We use annual data on inflows and outflows from the International Monetary Fund's *International Financial Statistics* (IFS) for the period 1975 to 2004.

As we are primarily concerned with changes in private capital flows, we follow the literature on sudden stops in limiting our sample to emerging market economies (that is, those economies with access to voluntary private capital flows) and developed economies.[9] For most of the exercises reported in this paper, we scale capital flows (inflows, outflows, and net capital flows) by a linear trend of dollar gross domestic product (GDP).[10] This allows us to disentangle capital account volatility from the volatility of real output and the real exchange rate.

1.2 Identifying Different Types of Capital Account Reversal

We follow Guidotti, Sturzenegger, and Villar (2004) in defining a sudden stop as a year in which the annual change in the capital account (scaled by GDP) is one standard deviation below the average and also below 5 percent of GDP. We take this definition because it is fairly representative of what the literature in this area has termed sudden stops. Both the standard deviation and the average are country specific. This leads us to identify a hundred sudden stop episodes in our sample of 1,580 observations (roughly 6 percent of the sample). We then build a measure of the contribution of the fall in inflows to each sudden stop episode:

$$S_t^I = \frac{\Delta I_t}{\Delta I_t + \Delta O_t}, \tag{1}$$

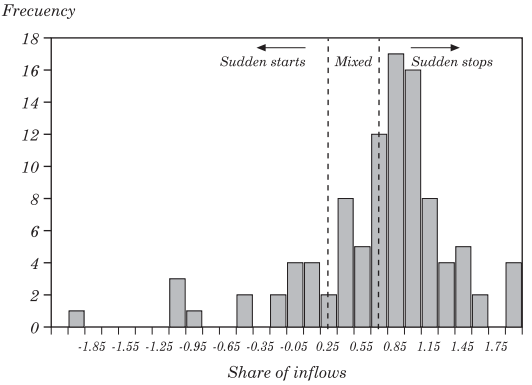
where ΔI_t and ΔO_t are the changes in inflows and outflows, respectively, between t – 1 and the current (sudden stop) period, *t*.

9. Appendix A lists the countries in our sample, which is based on the Organization for Economic Cooperation and Development (OECD) and the countries listed in the EMBI+ index.

10. Alternative measures that scale gross and net inflows by lagged GDP or a lagged moving average generate very similar results.

Figure 1 plots the histogram of for all hundred episodes. Most observations (56 percent) are between 0 and 1, indicating that inflows and outflows moved in the same direction: foreign liabilities fell, and foreign assets rose. Values above 1 (31 percent) mean that outflows undid the reversal of inflows, offsetting their impact on the financial account. Values below 0 (13 percent) imply that inflows actually rose during the sudden stop episode.

Figure 1. Share of Inflows, StI, in Capital Account Reversals[a]



Source: Authors' calculations, based on IFS data.
a. The share of inflows in the capital account is defined by equation (1). The dashed vertical line identifies the categories of different types of reversals. A value between 0 and 1 means that both outflows and inflows contributed to the reversal. Values above 1 and below 3 imply that outflows and inflows, respectively, undid the reversal of the capital account.

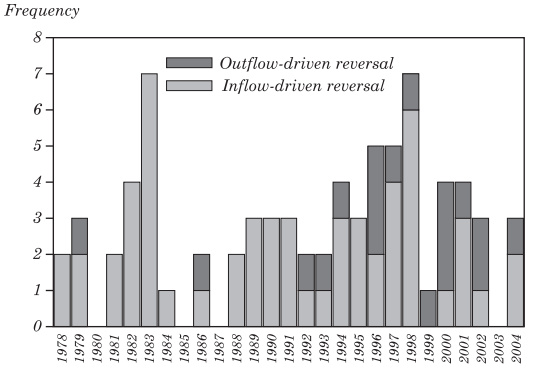
We split the sudden stop episodes into three categories: outflow-driven sudden stops, which we define as $S_t^I < 0.25$, inflow-driven sudden stops ($S_t^I > 0.75$), and mixed cases. Figure 1 illustrates the split with dashed vertical lines. Our premise is that reversals driven by outflows do not correspond to external financing shocks, since changes in domestic residents' portfolios are driving the net flow.

Of the hundred sudden stops in the sample, just over half (fifty-seven) correspond to inflow-driven sudden stops, whereas slightly below a fifth (eighteen) are outflow driven. These ratios change considerably when we split the sample into emerging and developed economies. Of the thirty-six sudden stops in developed economies, only 40 percent are inflow driven. This ratio rises to 65 percent for emerging market economies. Sudden stops (as defined in the literature) are a better proxy for external financing shocks in emerging market economies

than in developed countries. On the flip side, even in emerging market economies inflow-driven sudden stops are considerably less frequent than the net sudden stop measure suggests. In other words, many experiences that are called sudden stops are better described as a domestic shock that leads to a joint reaction of domestic and foreign agents. From the policy perspective, if external insurance decisions are based on sudden stop probabilities, then countries are overinsuring.

Figure 2 plots the different types of reversal by year. As the figure shows, inflow-driven sudden stops are clustered around 1982–83 and 1997–98, as one would expect if indeed these events are driven by events in international financial markets. The figure also shows that outflow starts are a fairly recent phenomenon and are spread out evenly from the early 1990s onward. This may be related to portfolio diversification by domestic residents, possibly as the result of capital account liberalization.

Figure 2. Reversals in Time, by Main Source[a]



Source: Authors' calculations, based on IFS data.
a. Inflow-induced reversals (sudden stops) are those in which $S_t^I > 0.75$; outflow-induced reversals (sudden starts) are those in which $S_t^I < 0.25$. Reversals in which both inflows and outflows are responsible ($0.25 < S_t^I < 0.75$) are not shown and represent 25 percent of all reversals identified.

1.3 Does the Distinction Matter?

The next step is to investigate whether this distinction between types of sudden stop matters for macroeconomic outcomes. We explore this issue by looking at the behavior of key macroeconomic variables in a six-year window around the date of the net capital account reversal. Figure 3 shows the average path of output growth and investment

before and after the sudden stop. Panel A indicates that per capita GDP growth diminishes in both cases. However, in the case of an inflow-driven sudden stop, growth plummets from an average of 2.1 percent in the preceding three years to –1.1 percent and –1.2 percent in the year of the reversal and the following one, respectively. The decline in growth is smaller for outflow-driven sudden stops, from 2.3 percent before to 1.9 percent afterward. This is four times less than in inflow-driven sudden stops, where the drop was from 2.1 percent to 0.6 percent average growth in the following years. Furthermore, table A2 shows that the average cumulative growth loss is 5.9 percent for inflow-driven sudden stops, while outflow reversals led to a reduction in growth of only –1.4 percent after three years.

Panel B reveals that investment falls by less in outflow-led reversals than in inflow-led sudden stops. In fact, the average cumulative loss in investment in the period following the sudden stop is almost twice as large in inflow stops (–15 percent) than in outflow starts (8 percent).

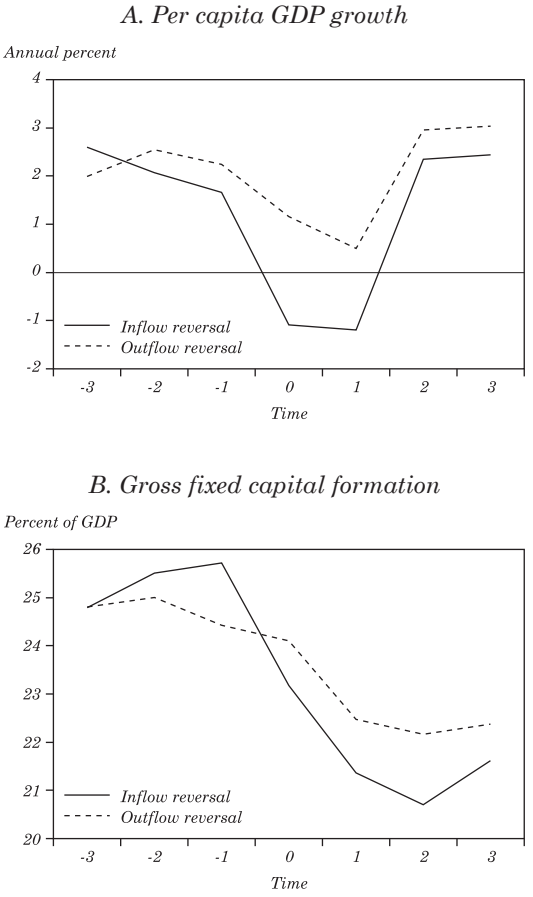
The larger impact of inflow reversals in figure 3 is corroborated by the results presented in the growth regression in equation (2), where growth (g) is regressed on its own lag and dummies for sudden stops (ss) and inflow reversals (ins). Inflow reversals are significantly associated with longer crises in which output growth recovers slowly.[11]

$$g_t = 1.7 + 0.31 \cdot g_{t-1} - 3.0 \cdot ss_t - 0.8 \cdot ss_{t-1} + 1.1 \cdot ss_{t-2} - 0.45 \cdot inss_{t-1} + \varepsilon. \quad (2)$$

Table A2 in the appendix reports the following additional descriptive statistics for both varieties of sudden stop: GDP growth, investment, domestic credit over GDP, exports over GDP, and the exchange rate. When comparing inflow- and outflow-driven episodes, we find that exports and domestic credit to the private sector are larger in countries that experience outflow reversals. The results reported in figure 3 suggest an alternative explanation for the fact that more open countries experience lower output drops following sudden stops (Guidotti, Sturzenegger, and Villar, 2004): more open countries are more likely to experience an outflow-induced sudden stop. More research is needed, however, to fully address this issue. An interesting additional extension

11. All coefficients are significant at 5 percent confidence. The results were robust for several specifications in which inflow-led sudden stops caused greater damage than mixed stops and outflow reversals.

Figure 3. Heterogeneity in Impact of Sudden Stops and Sudden Starts[a]



Source: Authors' calculations, based on IFS data.
a. Growth and investment are averages over the sample of episodes identified in the previous section. Reversals in which both inflows and outflows are responsible ($0.25 < S_t^I < 0.75$) are not shown and represent 25 percent of all reversals identified.

to this work would be to analyze the extent to which the determinants of net sudden stops differ from the determinants of inflow stops. Our previous results suggest they are different. In particular, the bunching of sudden stops in figure 2 suggests that inflow stops are driven more by events in global financial markets than are outflow starts, but a definite conclusion can not yet be reached.

1.4 Gross versus Net Inflow Reversals

The previous subsection split sudden stops according to the importance of the inflow drop in the change in the net capital account. This procedure, however, excludes episodes in which inflows to a country are curtailed, but outflows adjust to offset the stop. To explore this possibility, we build a direct measure of gross inflow reversal and compare the incidence of these events with the net reversal (*SS*) discussed above.

We define an inflow reversal as a period in which the change in non-FDI inflows, net of the average country change (scaled by trend GDP), is below –5 percent, which parallels our definition of sudden stops. We exclude FDI because we are interested in shocks originating in financial markets and because, as documented by Levchenko and Mauro (2006), FDI is remarkably stable even during sudden stops.

Based on this definition, we identify 147 gross inflow reversals.[12] Only sixty-two of these (42 percent) coincide with the sudden stops defined as net reversals in the previous section. This suggests that outflows mitigate the effects of a sudden stop of inflows in most of the cases (eighty-five inflow reversals). The most interesting fact is that a much higher share of gross inflow reversals coincide with net reversals in emerging market economies (forty-four out of sixty-six) than in developed countries (eighteen out of eighty-one).

Table 1. Coincidence of Net and Gross Inflow Reversals[a]

Sample group	*Both coincide*	*Only net reversal*	*Only gross reversal*
Developed economies	18	18	63
Emerging market economies	44	20	22
Total	62	38	85

Source: Authors' calculations, based on IFS data.
a. The first column indicates the number of episodes that were defined as a net reversal as defined in section 1.1 and a gross reversal defined using non-FDI inflows. The second and third columns show the number of episodes that did not coincide.

12. The 147 gross inflow reversals consist of eighty-five that are gross reversals only and sixty-two in which the inflow reversal coincides with a net reversal. According to the standard definition of sudden stops, however, there are only a hundred episodes, of which thirty-eight are net reversals only (that is, without an inflow reversal) and thus are sudden starts rather than sudden stops. The remaining sixty-two are net reversals and gross inflow reversals. The same computations can be made across rows for developed and emerging market economies.

This simple analysis suggests that the key distinction between developed and emerging market economies is not in the volatility of non-FDI inflows, but in the covariance between inflows and outflows. Both groups have considerable amounts of gross inflow reversals (eighty-one in developed economies and sixty-six in emerging markets), but in emerging market economies, outflows do not offset the reversal of inflows. Of course, causality could be running in the opposite direction, with changes in outflows in developed economies leading to offsetting changes in inflows. We investigate this aspect of gross capital flows further in the following section.

2. Gross versus Net Capital Flows: Stylized Facts

The previous section focused on the lower tails of the distributions of net and gross capital inflows, and it further reduced the analysis of the tails to a set of arbitrary binary variables. Using these dummy variables is a reasonable approach if one thinks that the world behaves in a nonlinear way, with economies running into vertical supply constraints, as in the work of Caballero and Krishnamurthy (2001) and others. By focusing on these episodes, however, we are disregarding a lot of information on gross and net capital flows from our sample. Moreover, defining episodes necessarily involves discretionary choices in the establishment of thresholds, which may not coincide with the vertical episodes of theoretical models. With these concerns in mind, in this section we characterize gross and net capital flows for our sample of developed and emerging market economies. We begin by identifying the differences and similarities between these two (also arbitrary) groups of countries. We then move to a more general (and robust) approach that differentiates the behavior of capital flows across income levels and degrees of financial integration.

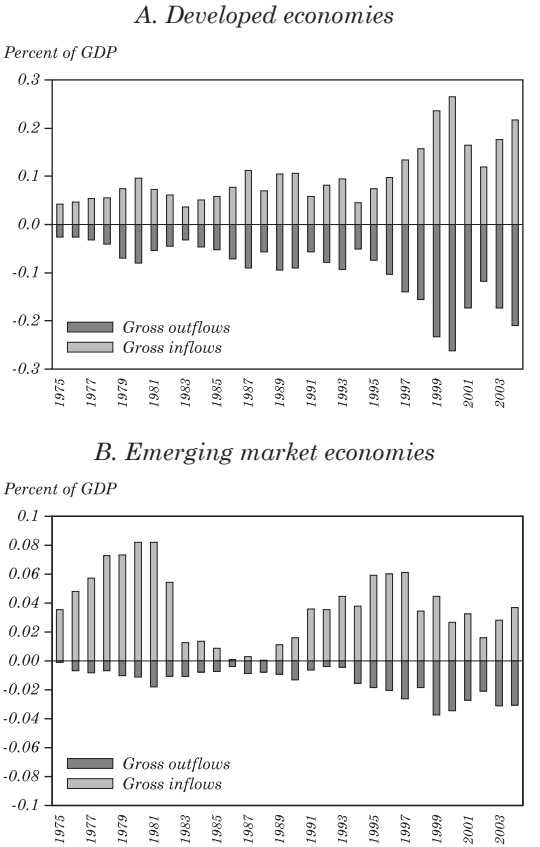
2.1 Capital Flows in Emerging and Developed Economies

Figure 4 plots the average gross capital flows in emerging and developed economies.[13] The figure reveals at least three notable

13. The group averages presented in figure 4 hide considerable cross-country variation, as is evident in figure A1. We exclude offshore financial centers, in which inflows and outflows are automatically matched, since capital is raised and funneled offshore once again. We therefore decided to exclude Ireland, Belgium, Great Britain, and Switzerland from our sample at this point, because they are outliers in terms of the size of average inflows and outflows.

trends. First, gross flows swamp net flows in developed economies. This is the flow counterpart of the increasing level of financial integration documented by Lane and Milesi-Ferretti (2003). Second, gross inflows and outflows in developed economies took off in earnest in the second half of the 1990s and leveled off in the current decade, while outflows are a very recent feature in emerging markets. Finally, gross flows in emerging market economies lag considerably behind

Figure 4. Yearly Average Gross Inflows and Outflows through Time[a]



Source: Authors' calculations, based on IFS data.
a. Gross inflows and outflows are shown as a percent of trend GDP. Note the difference in y-axis for developed and emerging market economies.

those of developed economies, so that the average gross flows of emerging market economies in 2004 were similar to the average gross flows of the developed economies in the mid-1970s. Until the second half of the 1990s, emerging market economies mostly had net capital inflows. This changed in the current decade, as many emerging market economies countries have been accumulating reserves and posting current account surpluses.

We turn now to the variance of the changes in gross inflows and outflows and net flows. Our working with changes instead of levels is motivated by the literature on sudden stops and reversals that emphasizes the macroeconomic consequences of these reversals. Gross and net flows are normalized by trend GDP. We also remove the (usually insignificant) country mean of the changes to separate country trends from volatility. We denote the change in the net capital account ΔF, changes in inflows ΔI, and changes in outflows ΔO.

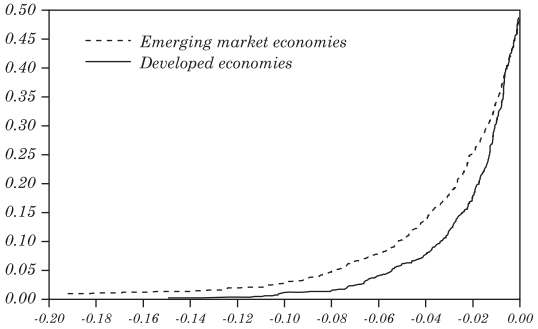
Our first result is that emerging market economies have more volatile net capital flows than developed economies, as expected. Table 2 shows that the standard deviation of ΔF in the average (median) emerging market economy is 80 percent (110 percent), higher than in the average (median) developed economy. This is in line with the results from the previous section, which found that large negative values of ΔF (sudden stops) are more common in emerging market economies than in developed countries. This result is confirmed in figure 5, which plots the negative segment of the cumulative distribution functions for ΔF.

Table 2. Volatility of Capital Flows[a]

	$\sigma\Delta F$		$\sigma\Delta I$	
Sample group	*Mean country*	*Median country*	*Mean country*	*Median country*
(1) Developed economies	0.027	0.021	0.044	0.041
(2) Emerging market economies	0.048	0.043	0.049	0.043
(2)/(1)	–1.8	2.1	1.1	1.0

Source: Authors' calculations, based on IFS data.
a. σ represent the standard deviation and ΔF, ΔI represent the change in net capital flows and inflows, respectively.

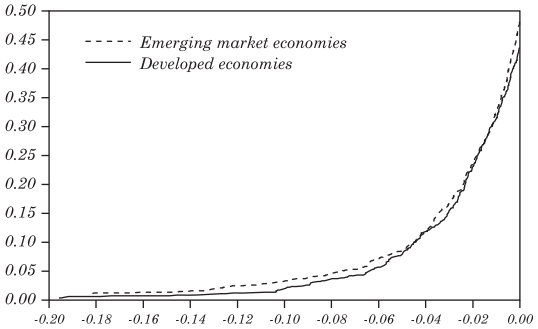
Figure 5. Change in Net Capital Flows[a]



Source: Authors' calculations, based on IFS data.
a. The above figure ignores the positive section of the cumulative distribution of net capital flows. Net flows are lower in emerging market economies.

Our second finding is that the volatility of inflows is remarkably similar across emerging market and developed economies. Large reversals in inflows are equally as likely in the two groups. We find this to be true for both FDI and non-FDI inflows. To corroborate this point, figure 6 plots the cumulative distribution functions of ΔI in both developed and emerging market economies.

Figure 6. Change in Gross Non-FDI Inflows[a]



Source: Authors' calculations, based on IFS data.
a. The above figure ignores the positive section of the cumulative distribution of non-FDI inflows. Gross non-FDI inflows have a similar distribution across country groups

This result is at odds with the presumption that volatile inflows cause emerging market economies to face a larger flux of net capital flows, which then leads recurrently to sudden stop episodes. To

investigate this issue further, we separate the determinants of the volatility of ΔF using a simple variance-decomposition exercise. We split the variance in both groups of countries into the variance of non-FDI inflows (σ^2_{nfdiI}), FDI inflows (σ^2_{fdiI}), outflows (σ^2_O), and their respective covariances. Table 2 confirms that the volatility of inflows is of similar magnitudes in emerging market and developed economies, although the volatility of net capital flows is much higher in emerging market economies than developed countries. Moreover, table 3 shows that outflows are more volatile in developed than in emerging market economies. Most of the volatility of ΔF, however, is explained by the much larger negative covariance between non-FDI inflows and outflows in developed than in emerging market economies (row 5).

We can thus conclude that what makes reversals much less common in developed countries relative to emerging market economies is the strongly negative correlation between inflows and outflows in the first group of countries. In developed economies, capital outflows mitigate the effect of a sudden reversal of inflows (or vice versa).

Table 3. Variance Decomposition[a]

Source of Variance	*Emerging market economies*	*Developed economies*	*Emerging – developed*	*Share of total*
Var (Δ Non-FDI inflows)	26.3	20.9	5.3	0.30
Var (Δ FDI inflows)	1.6	3.1	–1.5	–0.08
Var (Δ Outflows)	7.9	16.1	–8.3	–0.45
2Cov (Δ Non-FDI inflows, Δ FDI inflows)	0.4	–1.1	1.5	0.08
2Cov (Δ Non-FDI inflows, Δ Outflows)	–8.5	–25.6	17.0	0.95
2Cov (Δ FDI inflows, Δ Outflows)	–1.0	–4.4	3.4	0.19
Var (Δ Financial account)	26.6	8.5	18.0	1.00

Source: Authors' calculations, based on IFS data.
a. Numbers are × 10,000 for expositional purposes.

2.2 Discussion of Results: A Simple Framework of Gross Flows

In this section, we present a simple mean-variance portfolio framework to help explain the stylized facts documented in the

previous subsection.[14] Consider a small open economy in which there is a premium between domestic returns and international returns. We assume that this premium ($\rho + \xi I$) is the loss to foreign investors from selective defaults on debt contracts or expropriation risk. This premium is increasing in the level of foreign liabilities held by domestic agents (I). The higher the level of foreign debt, the larger the incentive to default. More generally, it is not important that only foreigners bear these costs; what is crucial in our framework is that the costs are perceived to be higher for foreigners. The risk premium, ρ, is stochastic with a mean equal to μ_ρ and variance of σ^2_ρ.

Domestic residents have a stock of wealth ($W \geq 0$) that they can invest in a risky technology at home ($H \geq 0$) or abroad at a riskless rate R^* ($O \geq 0$). Returns to the domestic technology are a decreasing function of total capital, K, such that

$$R = A - \alpha K,$$

and A is random productivity term, with a time-varying mean, μ, and constant variance, σ^2. Productivity in this case is a broad expression for profitability, which should also include terms of trade shocks, macroeconomic policies, and so forth. In addition, ρ and μ are realized before domestic and foreign investors make their portfolio decisions. The only remaining source of uncertainty is the realized return on domestic output, A.

International investors are risk neutral, so the following international arbitrage condition holds for capital inflows, I:

$$\mu - \alpha K = R^* + (\rho + \xi I). \tag{3}$$

We assume that domestic productivity is such that $\mu - \alpha W > \rho + R^*$, over the whole support of ρ, so that there are nonzero capital inflows even when all domestic wealth is invested domestically. Equation (3), pins down total capital in the domestic economy:

$$K = \frac{\mu - (\rho + \xi I) - R^*}{\alpha}.$$

14. Tille and van Wincoop (2007) and others incorporate portfolio choice into a dynamic stochastic general equilibrium (DSGE) macroeconomic framework that generates a general equilibrium with meaningful capital flows.

Domestic agents maximize a mean variance utility function, which after substituting for returns is:

$$U = H(\mu - \alpha K) + (W - H)R^* - \frac{1}{2}\gamma(H\sigma)^2,$$

where γ represents risk aversion and $(H\sigma)^2$ is the variance of the portfolio of domestic agents. From the first order condition for H, we obtain the following optimal portfolio allocation for local residents:

$$H = \min\left\{\frac{\rho + \xi I}{\gamma\sigma^2}, W\right\}, \text{ and} \tag{4}$$

$$I = \frac{1}{1 + \xi\phi}\left(\frac{\mu - \rho - R^*}{\alpha} - \frac{\rho}{\gamma\sigma^2}\right), \tag{5}$$

where $\phi = [(1/\alpha) + (1/\gamma\sigma^2)]$.

Next we analyze two possible outcomes for this model, depending on total domestic wealth being above or below

$$\overline{W} = \frac{1}{\gamma\sigma^2}\left\{\frac{\rho + \xi\left[(\mu - R^*)/\alpha\right]}{1 + \xi\phi}\right\},$$

which is obtained by using I from equation (5) in H from equation (4).

2.2.1 Case 1: $\overline{W} < W$

This is the case of financial diversification, in which a nonzero share of domestic wealth is invested offshore. Using the previous results we can find expressions for the stock of international assets (O)—which, following the balance-of-payment conventions, is negative—and the net capital account (F):

$$O = -W + \frac{1}{\gamma\sigma^2}\left\{\frac{\rho + \xi\left[(\mu - R^*)/\alpha\right]}{1 + \xi\phi}\right\}; \tag{6}$$

$$F = \frac{1}{\alpha}\left[\frac{1}{1+\xi\phi}\left(\mu - \rho - R^* + \xi\frac{\mu - R^*}{\gamma\sigma^2}\right)\right] - W. \tag{7}$$

Here, O is the difference between demand for capital and domestic wealth, the remainder being owned by foreigners. In this case, $I > 0$ because of the assumption made above on the parameters. Foreign assets are decreasing (in absolute terms) in the country risk premium and in the sensitivity of foreign investment to the level foreign liabilities (ξ), and they are increasing in wealth.[15]

Using the above expressions, we can check that the following equations hold for the variance and covariance of inflows and outflows in the face of shocks to expected domestic productivity, μ, and the risk premium, ρ:

$$\sigma_I^2 = \frac{1}{(1+\xi\phi)^2}\left[\frac{\sigma_\mu^2}{\alpha^2} + \sigma_\rho^2\left(\frac{1}{\alpha} + \frac{1}{\gamma\sigma^2}\right)^2\right],$$

$$\sigma_O^2 = \left(\frac{1}{1+\xi\phi}\frac{1}{\gamma\sigma^2}\right)^2\left[\sigma_\rho^2 + \left(\frac{\xi}{\alpha}\right)^2\sigma_\mu^2\right], \text{ and}$$

$$\sigma_{IO} = \frac{1}{\gamma\sigma^2}\frac{1}{(1+\xi\phi)^2}\left[\frac{\xi}{\alpha^2}\sigma_\mu^2 - \left(\frac{1}{\gamma\sigma^2} + \frac{1}{\alpha}\right)\sigma_\rho^2\right],$$

where σ_μ^2 is the variance of μ. The covariance between inflows and outflows is more negative the larger are the shocks to the risk premiums, σ_ρ^2, but it is closer to zero the larger the shocks to productivity, σ_μ^2. This is intuitive: when facing a rise in ρ, domestic agents will repatriate part of their savings to take advantage of higher domestic returns. If the shock is to productivity, however, then domestic agents and foreigners will move their funds in the same direction.

2.2.2 Case 2: $\overline{W} \geq W$

In this case, all of domestic wealth is invested at home. Returns are high enough to compensate for the increased risk domestic investors face. Here, $O = 0$, and $F = I = K - W$.

15. The fraction $dO / d\xi$ is positive when $[(\mu - \rho - R^*) / \alpha] - \rho / \gamma\sigma^2 > 0$, ($\Leftrightarrow I > 0$).

$$I = \frac{1}{1+(\xi/\alpha)}\left(\frac{\mu-\rho-R^*}{\alpha}-W\right).$$

The structure of variances and covariance is given by

$$\sigma_I^2 = \frac{1}{(1+\xi/\alpha)^2}\frac{1}{\alpha^2}\left(\sigma_\mu^2+\sigma_\rho^2\right);$$

$$\sigma_O^2 = 0;$$

$$\sigma_{IO} = 0.$$

This simple framework illustrates several plausible differences between emerging and developed economies that may explain the stylized facts reported in the previous section. First, emerging market economies are more likely than developed economies to have low wealth, high ρ, high ξ, or large foreign liabilities that push up the total risk premium, and they are also more likely to hold no or few international assets. This being the case, emerging market economies will have a lower covariance (in absolute terms) between inflows and outflows. Matching the similar σ_I^2 across emerging and developed economies is not so simple in this setting, however. Indeed, which σ_I^2 is higher is ambiguous.

A second possibility that is often discussed in the literature puts emerging market economies in the $\overline{W} < W$ region, but with a more volatile production technology (that is, a higher σ_μ^2). In this model the higher σ_μ^2 leads to a covariance of inflows and outflows that is closer to zero (or even positive), which matches the stylized facts. A higher σ_μ^2, however, also translates into a higher σ_I^2 for emerging market economies, a fact that is not supported by the data.

The final possibility is closest to the sudden stop literature. Consider the case in which emerging market economies face more volatile financing (that is, a higher σ_ρ^2) or a steeper supply curve for international capital. Both correspond to imperfections in international capital markets. Note, however, that higher σ_ρ^2 in emerging market economies would actually lead to a larger (absolute) covariance between inflows and outflows. A higher ξ, in turn, has an ambiguous effect on σ_{IO} and dampens σ_I^2.

This simple model illustrates how several differences (financial or productive) between emerging and developed economies are consistent

with the differences in moments reported above. Moreover, simply splitting countries into emerging and developed economies, does not clarify which specific variable is driving the differences. With this in mind, we use the following section to characterize differences in σ_{IO}, the key component in the variance decomposition. Our main objective is to disentangle the productive and financial differences.

2.3 Income Levels, Risk Premiums, and Assets Abroad

A first implication of the model presented above is that the stock of foreign assets held by domestic residents (equation 6) is increasing in wealth and decreasing in the spread charged by foreign investors on domestic assets. To evaluate this implication, table 4 estimates the correlation between gross international assets over GDP, per capita income (a proxy of financial wealth), and the Emerging Markets Bond Index (EMBI) spread or Moody's country debt rating (a proxy for risk premium). The sample is limited to countries for which data on the EMBI or debt rating is available. The first column reports the simple cross-section correlation for 2001 between external assets over GDP and the log of the EMBI spread. As expected, the correlation is negative and significant: countries with a low risk premium have more assets abroad. To control for wealth, we include the log of per capita GDP in the second column. The estimated signs are as expected, although significance is lost. The results are similar when we use country debt ratings instead of the EMBI spread (column 3).[16] The next two columns pool all available years and run country fixed-effects regressions using the EMBI spread and country debt ratings, respectively. In both regressions, as the model predicts, the correlation between the proxy for country premium and gross international assets is negative, even after controlling for a country fixed effect. As a country's investment premium falls, the gap between domestic and foreign returns falls, and thus investment abroad increases.

2.4 Capital Flows, Income Levels, and Financial Integration

A second implication of the model is that countries that are more likely to be in the internationally diversified region will have a more negative covariance of inflows and outflows, so that international

16. Ratings fall with risk, which explains the positive coefficient in this case.

Table 4. Country Risk and Gross International Asset Positions[a]

Explanatory variable	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*
Log EMBI	−0.300	−0.219		−0.086	
	(0.158)*	(0.161)		(0.038)**	
Rating			0.293		0.018
			(0.120)**		(0.008)**
Log GDPt−1		0.131	0.029		
		(0.155)	(0.029)		
Summary statistic					
No. observations	22	22	29	156	313
R^2	0.16	0.19	0.2	0.91	0.91
Period	2001	2001	2001	1992–2004	1986–2004
Fixed effects				Country and year	

Source: Authors' estimations.
* Statistically significant at the 10 percent level. ** Statistically significant at the 5 percent level. *** Statistically significant at the 1 percent level.
a. The dependent variable is external assets over GDP. Rating ranges from 1 to 16. Robust standard errors are in parentheses.

diversification reduces the volatility of the net capital account. We start by analyzing the covariance of $\Delta I_{i,t}$ and $\Delta O_{i,t}$ across levels of international financial assets and overall levels of economic development (as measured by per capita income). We include per capita income as a catch-all term, which is likely to be correlated with the structure of shocks hitting the economy, σ_{μ}^2, or with access to international capital markets (higher σ_{ρ}^2 or higher ξ).

Specifically, we estimate

$$\sigma_{IO} = \gamma_1 + \gamma_2 y_{i,t-1} + \gamma_3 A_{it-1} + \mu_{it}. \tag{8}$$

The first two columns of table 5 report the results for the full sample, while the next two columns provide the results for the subsamples of emerging and developed economies, respectively. We find that σ_{IO} is decreasing in the level of assets abroad in all specifications (with significant coefficients). This suggests that part of the difference between emerging and developed economies stems from their level of financial integration. Moreover, we also obtain a negative coefficient for per capita income (significant in the median regression in the second column), which is consistent with either larger productivity shocks or potentially less financial integration (in the form of higher ξ).

Table 5. Covariance Changes on Outflows and Inflows (over GDP)[a]

Explanatory variable	*(1)*	*(2)*	*(3)*	*(4)*
Assets abroad (avg ln)	–7.351 (2.848)**	–4.234 (1.516)***	–7.303 (3.791)*	–8.602 (4.824)*
Per capita GDP (avg ln)	–0.219 (1.532)	–1.708 (0.841)**	–0.886 (2.805)	–1.22 (3.045)
Summary statistic				
No. observations	48	49	31	17
R^2	0.22		0.17	0.2
Method	OLS	Median	OLS	OLS
Sample	All countries	All countries	Emerging markets	Developed

Source: Authors' estimations.
* Statistically significant at the 10 percent level. ** Statistically significant at the 5 percent level. *** Statistically significant at the 1 percent level.
a. Dependent Variable is σ_{IO}. Standard errors are in parentheses.

Next, to use time variation in the main independent variables, we study the yearly comovement of changes in outflows ($\Delta O_{i,t}$) and inflows ($\Delta I_{i,t}$), allowing the comovement to vary across levels of gross foreign assets and per capita income. Specifically, we estimate

$$\Delta O_{it} = \delta + \Delta I_{it}\,(\gamma_1 + \gamma_2 y_{i,t-1} + \gamma_3 A_{i,t-1}) + \theta_1 y_{i,t-1} + \theta_2 A_{i,t-1} + \mu_{it}, \qquad (9)$$

where $y_{i.t-1}$ is the lagged log of per capita GDP. We are interested in γ_2, which measures the impact of per capita income on the correlation between $\Delta O_{i,t}$ and $\Delta I_{i,t}$ and γ_3, where the latter captures the effects of foreign assets on this correlation. The results of this estimation are presented in table 6.

Our results are qualitatively identical to those reported in the previous table. The first column present the result for the full sample, while the next two columns report the results for the subsamples of emerging and developed economies, respectively. In all cases we obtain a negative coefficient for γ_2, which is significant for the full sample and for developed economies. The correlation between inflows and outflows falls with the income level, even within emerging and developed economies and after controlling for foreign assets. More importantly, we obtain negative and significant coefficients for γ_3 in all samples. Countries holding more gross foreign assets (that is, that

Table 6. Baseline Regression: Changes in Outflows and Changes in Gross Inflows

Explanatory variable	*(1)*	*(2)*	*(3)*
A. Inflows are changes in non–FDI inflows over trend GDP			
Interactions			
Δ Inflows x ln (GDP) (–1)	–0.096 (0.048)**	–0.09 (0.091)	–0.094 (0.055)*
Δ Inflows x Gross assets to GDP (–1)	–0.185 (0.055)***	–0.174 (0.073)**	–0.214 (0.063)***
Main effects			
Δ Inflows	–0.235 (0.024)***	–0.231 (0.048)***	–0.207 (0.100)**
ln (GDP) (–1)	0.000 (0.001)	0.000 (0.001)	–0.001 (0.003)
Gross assets to GDP (–1)	0.000 (0.001)	0.000 (0.002)	0.000 (0.002)
B. Inflows are changes in all inflows over trend GDP			
Interactions			
Δ Inflows x ln (GDP) (–1)	–0.101 (0.042)**	–0.074 (0.085)	–0.111 (0.041)***
Δ Inflows x Gross assets to GDP (–1)	–0.203 (0.048)***	–0.183 (0.069)***	–0.251 (0.052)***
Main effects			
Δ Inflows	–0.243 (0.022)***	–0.224 (0.045)***	–0.176 (0.092)*
ln (GDP) (–1)	0.000 (0.001)	0.000 (0.001)	–0.002 (0.003)
Gross assets to GDP (–1)	0.000 (0.001)	0.000 (0.002)	0.000 (0.001)
Summary statistic			
No. observations	1,271	770	501
Sample	All countries	Emerging	Developed

Source: Authors' estimations.
* Statistically significant at the 10 percent level. ** Statistically significant at the 5 percent level. *** Statistically significant at the 1 percent level.
a. The dependent variable is the change in outflows. Robust standard errors are in parentheses.

are more financially integrated) show lower correlations between gross inflows and gross outflows.

In the simple model presented above, after we control for the level of financial integration, the remaining differences across countries were captured by productivity shocks, σ_{μ}^{2}, and financial variables, ξ.

The difference in the volatility of productivity certainly is one plausible explanation, as suggested by Aguiar and Gopinath (in this volume). It also seems reasonable that the risk premiums grow faster with debt in emerging market economies. However, this is not an exhaustive list of explanations for the results reported in the previous three tables. For a start, in the model, σ_{μ}^{2} can also be thought to capture shifts in the perceptions of productivity common to domestic and foreign savers. If these are more likely to change in lower-income countries, as has been emphasized by the "wake-up call" literature, then information asymmetries and updating of priors explain the stylized facts, not true productivity patterns. Per capita income may also be capturing variations in financial development that condition how inflows and outflows covary. As emphasized by Caballero and Krishnamurthy (2001), agents holding foreign assets are not usually the agents borrowing from international markets. The extent to which *O* will respond to a shock to *I* that drives up the marginal product of domestic borrowers will depend on the ability of the domestic financial system to intermediate resources from one agent to another. It remains to be seen, for example, whether the Chilean institutional investors that currently hold large stocks of foreign assets will repatriate their foreign assets in the event of a shock to the cost of Chilean external financing. Finally, the model presented above assumes that domestic productivity rises when foreign investors withdraw, as a result of a decreasing marginal product of capital. This is probably true in economies that are financially robust—which is not always the case in lower-income economies. Indeed, an extensive literature emphasizes the financial vulnerabilities that arrive from currency and maturity mismatches. This being the case, the fact that outflows in low-income economies accompany inflows may be the optimal response to domestic financial distress.

3. Conclusions

This paper provides a broad empirical characterization of gross and net capital flows to emerging and developed economies. The first part of the paper centers on reversals—either large changes in net capital flows or large changes in gross inflows. The second part of the paper looks at gross inflows and outflows and analyzes the variance and covariance of gross inflows and outflows more generally. Accordingly, the conclusions of the paper also fall into two groups. We discuss each in turn.

A large (and growing) literature examines the causes and effects of large reversals in the capital account (sudden stops), as these events are usually associated with output loss or financial distress. This paper argues that by concentrating on the full set of reversals, we are bunching too many phenomena together. The reversal could be a current account reversal, driven by changes in the saving-investment decisions. Shocks to the terms of trade or productivity, or even policy shocks such as changes in public savings or exchange rate misalignments, all fall into this category. Alternatively, the reversal could be triggered on the financial side, driven by the capital account. It is therefore is necessary to distinguish two types of reversal. The event could be a true curtailment of capital inflows (the idea behind the sudden stop literature), or it could be driven by the decision of domestic residents to diversify their portfolios and invest abroad.

With these distinctions in mind, we split sudden stops—that is, large reversals in the capital account—into inflow-driven and outflow-driven reversals. We then argue that it is the former that corresponds to shocks originating in international capital markets emphasized by much recent literature, and these inflow reversals are the true sudden stops. This distinction narrows the number of episodes substantially, suggesting that the incidence of sudden stops may have been overstated. Moreover, we show that the inflow-driven sudden stops have the largest output and investment costs, and we confirm that this form of shock is truly costly for merging market economies.

In the second part of the paper, we show—contrary to what is often proposed—that international financial markets for developed economies are as turbulent as those for emerging markets, with large reversals in gross flows. The key distinction appears to be that for emerging market economies, shocks to inflows (or outflows) are not offset by an opposing movement from outflows (inflows). This may be due to differences in the nature of shocks (productivity shocks versus risk premium shocks) or simply to a lack of international assets with which to accommodate a reversal of inflows. Moreover, we find that the negative covariance between inflows and outflows is higher for countries with high initial stocks of international assets and higher per capita income. We take the first variable as a proxy for the capacity to smooth portfolio shocks, and the second as a broad proxy for the willingness to smooth shocks. Taken together, this implies that emerging market economies are less able to accommodate sudden stops

in inflows because they hold much smaller stocks of foreign assets, on average, and they are often less willing to do so because the inflow is responding to lower realized or expected domestic productivity, because domestic financial markets are subject to failures, or because domestic and foreign agents anticipate the costs of a gross flow reversal if the economy is financially vulnerable.

The results presented in this paper motivate a series of additional research questions that are relevant for emerging market economies. First, analysts need to develop models that link optimal reserve levels to total foreign assets and domestic financial development. Countries with large stocks of foreign assets would likely need fewer reserves, particularly if the financial system operates properly. Second, further research is needed to determine whether the determinants of sudden stops are the same as the determinants of inflow-driven sudden stops. If differences are found, the preventive policies will differ. Third, additional research is needed to understand gross outflow shocks in developed and emerging market economies that are not fully offset by capital inflows. A key issue in this regard is identifying the set of domestic or international conditions, such as regulatory changes or macroeconomic policies, that leads to sudden outflows of capitals.

APPENDIX

Supplemental Data, Stylized Facts, and Regression Results

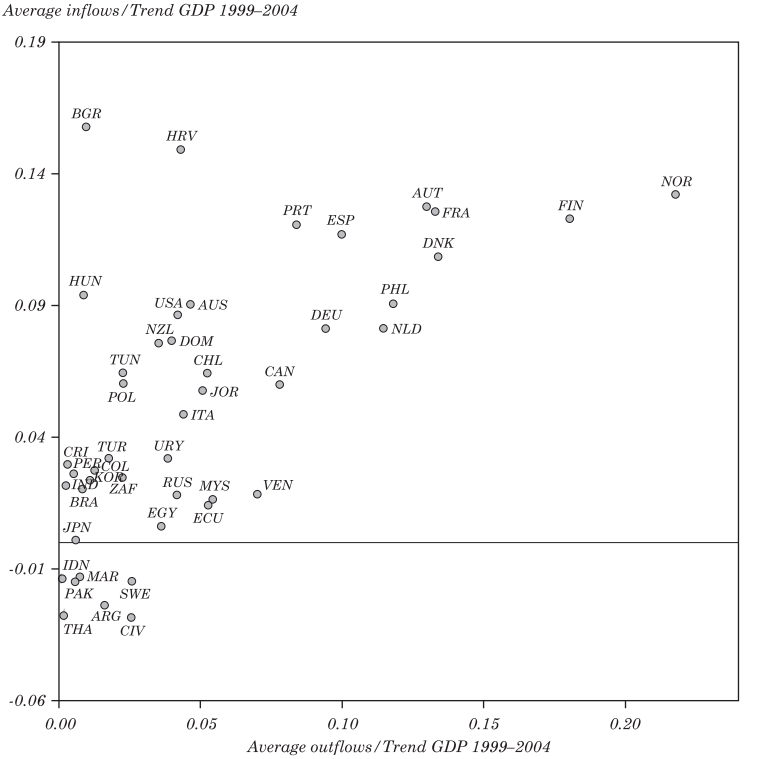
Table A1. Sample of Countries[a]

Developed economies			*Emerging market economies*		
Country	*IFS code*	*World Bank code*	*Country*	*IFS code*	*World Bank code*
Australia	193	AUS	Algeria	612	DZA
Austria	122	AUT	Argentina	213	ARG
Belgium	124	BEL	Brazil	223	BRA
Canada	156	CAN	Bulgaria	918	BGR
Denmark	128	DNK	Chile	228	CHL
Finland	172	FIN	Colombia	233	COL
France	132	FRA	Costa Rica	238	CRI
Germany	134	DEU	Côte d'Ivoire	662	CIV
Iceland	176	ISL	Croatia	960	HRV
Ireland	178	IRL	Dominican Republic	243	DOM
Italy	136	ITA	Ecuador	248	ECU
Japan	158	JPN	Egypt	469	EGY
Netherlands	138	NLD	Hungary	944	HUN
New Zealand	196	NZL	India	534	IND
Norway	142	NOR	Indonesia	536	IDN
Portugal	182	PRT	Jordan	439	JOR
Spain	184	ESP	Korea	542	KOR
Sweden	144	SWE	Malaysia	548	MYS
Switzerland	146	CHE	Mexico	273	MEX
United Kingdom	112	GBR	Morocco	686	MAR
United States	111	USA	Nigeria	694	NGA
			Pakistan	564	PAK
			Peru	293	PER
			Philippines	566	PHL
			Poland	964	POL
			Russia	922	RUS
			South Africa	199	ZAF
			Thailand	578	THA
			Tunisia	744	TUN
			Turkey	186	TUR
			Uruguay	298	URY
			Venezuela, R.B.	299	VEN

Source: Authors' construction.

a. The sample was selected by starting with the Organization for Economic Cooperation and Development (OECD) and adding countries from the EMBI index of emerging economies. Countries that were present in both groups were considered emerging economies. Hungry, Korea, Mexico, Poland, and Turkey thus fell into the category of emerging economies, although they are members of the OECD. The Czech Republic, Greece, Luxembourg, Panama, and the Slovak Republic were dropped owing to data limitations.

Figure A1. Heterogeneity in Average Gross Inflows and Outflows, 1999–2004[a]



Source: Authors' calculations, based on IFS data.
a. Gross inflows and outflows are shown as a percent of trend GDP. Ireland, Belgium, Great Britain, and Switzerland have been excluded as outliers. All have inflows/outflows well above 25 percent of trend GDP.

Table A2. Impact of Outflow and Inflow Sudden Stops[a]

	GDP growth		*Investment*		*Domestic Credit*		*Exports*		*Exchange Rate*	
Measure of Impact	*Inflows*	*Outflows*	*Inflows*	*Outflows*	*Inflows*	*Outflows*	*Inflows*	*Outflows*	*Inflows*	*Outflows*
(1) Maximum before	2.6	2.6	25.7	25.0	0.52	0.75	28.9	41.8	100.0	100.0
(2) Minimum after	–1.2	0.5	20.7	22.2	0.51	0.73	31.8	41.5	53.1	81.4
(3) (1) – (2)	3.8	2.1	5.0	2.8	0.02	0.02	–2.9	0.2	46.9	18.6
(4) Mean before	2.1	2.3	25.3	24.7	0.50	0.73	28.8	41.4	91.7	97.5
(5) Mean after	0.6	1.9	21.7	22.8	0.53	0.77	32.9	45.3	61.2	86.5
(6) (4) – (5)	1.5	0.4	3.6	2.0	–0.03	–0.04	–4.1	–3.8	30.5	11.0
(7) Cumulative loss	–5.9	–1.4	–14.5	–7.9	0.10	0.20	16.3	15.4	–122.0	–44.0

Source: Authors' calculations.

a. Sudden stop episodes cover the three years before the reversal and the three years after, resulting in a total of seven years including the sudden stop year. All statistics denominated after include t = 0. Cumulative loss is calculated as the sum of deviations from t = 0 to t = 3, subtracted from the average of the three years preceding the sudden stop. Sudden stop episodes determined to have mixed causes, $0.25 < \text{StI} < .075$, were omitted.

Table A3. Volatility of Capital Flows and GDP[a]

Dependant variable	*Standard dev net flows* ($\sigma_{\Delta net}$)	*Cov non-FDI inflows versus infows* ($\sigma_{\Delta nfdiI}$)	*Cov FDI inflows versus inflows* ($\sigma_{\Delta fdiI}$)	*Standard dev outflows* ($\sigma_{\Delta O}$)	*Cov FDI inflows* versus outflows ($\sigma_{fdiI\ ,\Delta O}$)	*Cov non-FDI inflows versus outflows* ($\sigma_{nfdiI\ ,\Delta O}$)
ln (GDP)	−58.280	10.127	9.82	50.870	−0.653	−4.001
	(25.025)**	(26.195)	(26.975)	(19.352)***	(0.281)**	(1.443)***
Constant	0.089	0.037	0.039	−0.013	0.000	0.003
	(0.021)***	(0.022)	(0.023)*	(0.016)	(0.000)*	(0.001)**
R^2	0.103	0.003	0.003	0.128	0.103	0.141

Source: Authors' estimations.
* Statistically significant at the 10 percent level. ** Statistically significant at the 5 percent level. *** Statistically significant at the 1 percent level. Robust standard errors are in parenthesis.
a. In the table, ln(GDP) is the log of the average purchasing power parity (PPP) per capita during the sample period divided by 10,000.

Table A4. Change in Outflows versus Change Inflow: Regression Results[a]

	Regression results				Sample					
					Group		Period		Sudden stop episodes	
	Estimated coefficients	Standard errors	N	R^2	Emerging	Developed	1975–89	1990–2004	SS = 1	SS = 0
A. Right-hand-side variable is Δ non-FDI inflows										
(1)	−0.165	0.051***	781	0.09	x		x	x	x	x
(2)	−0.583	0.046***	506	0.47		x	x	x	x	x
(3)	−0.069	0.044	342	0.03	x		x		x	x
(4)	−0.214	0.070***	439	0.12	x			x	x	x
(5)	−0.234	0.063***	236	0.14		x	x		x	x
(6)	−0.653	0.048***	270	0.54		x		x	x	x
(7)	−0.326	0.128**	64	0.31	x		x	x	x	
(8)	−0.251	0.066***	717	0.14	x		x	x		x
(9)	−0.765	0.079***	31	0.76		x	x	x	x	
(10)	−0.672	0.042***	475	0.55		x	x	x		x
B. Right-hand-side variable is Δ inflows										
(1)	−0.171	0.048***	781	0.1	x		x	x	x	x
(2)	−0.620	0.038***	506	0.58		x	x	x	x	x
(3)	−0.065	0.042	342	0.03	x		x		x	x
(4)	−0.223	0.065***	439	0.14	x			x	x	x
(5)	−0.243	0.063***	236	0.15		x	x		x	x
(6)	−0.689	0.039***	270	0.67		x		x	x	x
(7)	−0.346	0.129***	64	0.34	x		x	x	x	
(8)	−0.264	0.062***	717	0.17	x		x	x		x
(9)	−0.803	0.070***	31	0.88		x	x	x	x	
(10)	−0.697	0.033***	475	0.67		x	x	x		x

Source: Authors' estimations.
* Statistically significant at the 10 percent level. ** Statistically significant at the 5 percent level. *** Statistically significant at the 1 percent level.
a. The dependent variable in all regression is the change in the financial account. Standard errors are robust.

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