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Overreaction in capital flows to emerging markets: Booms and sudden stops[☆]

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A B S T R A C T

This paper applies the overreaction hypothesis of De Bont and Thaler [De Bont, W., Thaler, R., 1985. Does stock market overreact? Journal of Finance 40(3), 793–805], developed for stock price behavior, to capital flows to emerging markets. We find that a surge in capital flows, or what we call a *capital boom*, can predict future sharp contractions in capital flows, or *sudden stops*. We use a large list of possible economic fundamentals as control variables, and the results show that the best predictor of a sudden stop is a preceding capital boom. Moreover, the probability of a country undergoing a sudden stop increases considerably with the length of the boom: this probability more than doubles when the boom is three years old, and rises by three to four times when the boom lasts for four years. These results are interesting for two reasons. In the first place, they contradict previous studies that emphasize worsening fundamentals as the ultimate cause of a sudden stop. Second, they are of policy interest because of the enormous negative impacts that sudden stops have on the real economy.

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1. Introduction

Informal claims of overreaction in financial markets arise more frequently than what economists and analysts are prepared to admit, since they feel more comfortable anchoring stock price movements to informed expectations about future fundamentals. However, in a seminal work De Bont and Thaler (1985) evaluate what they call "overreaction" in the stock market and prove that, as is the case with many other human activities, financial markets show an excessive reaction to new information or unexpected events. One of their main conclusions is that a pronounced reversion in prices (negative returns) can be predicted by the observation of extreme preceding positive returns; in other words, an upward overreaction subsequently calls forth a dramatic downward adjustment.

An important aspect of this literature is the identification of an overreaction, which is related to psychological factors that push a price much beyond what would be determined by fundamental factors. Consequently, examples of markets with frequent overreaction behavior are those showing excess volatility. Such is the case of capital flows to emerging markets, where an unexplained volatility has been found. In a recent paper, Broner and Rigobón (2006) showed that capital flows to emerging markets are more volatile than those to developed countries. Using GDP per capita, inflation rates, real depreciation of exchange rates, terms of trade and interest rates for a set of emerging countries, the standard deviation of the error from panel estimations was greater than the error from a panel using data for developed countries by more than 60 percent. This standard deviation was significantly reduced using own lags of capital flows and contagion variables.

Our approach is different. We focus on the predictive power of a capital flow bonanza on subsequent and sharp reversions of capital flows, labeled *sudden stops* in recent literature, and consider this pattern as an example of overreaction. We define episodes of large capital flows to emerging markets, which we call *capital booms*, as those that are larger than a standard deviation above the historical mean and represent at least five percentage points of GDP. Using the definition of sudden stops by Guidotti et al. (2004), we define periods of abrupt reversions, or sudden stops, as those when capital flows decline by more than a standard deviation of their average variation during the sample period and when that decline is at least five percentage points of GDP. Similarly to the findings for stock prices, our results indicate that a capital-boom period is a good predictor of a subsequent sudden stop. Moreover, we find that the probability of a sudden stop increases dramatically the longer the preceding capital boom.

In our approach, emerging markets should be seen as an asset class for financial markets.[1] Leijonhufvud (2007) confirms this view. She shows that financial institutions have separate business units that manage profit and loss targets for their investments in emerging markets. Leijonhufvud stresses that this organizational form is responsible for the concentration of risk in emerging markets and the consequent formation of bubbles in asset prices. In addition, compensation systems "which link annual bonus payments to the amount of net income an employee has generated for the firm or its clients in a given year directly encourage employees to focus on short-term income opportunities" (Leijonhufvud, 2007). These ideas are lent credence by Kaminsky et al. (2004). Using monthly and quarterly data, they showed the existence of chartist strategies (buy winners and sell losers) and contagion trading in mutual funds dedicated to Latin American assets. These strategies proved stronger during crises.

In this paper, we use the financial account of the balance of payments (excluding reserve movements) as our closest measure of net capital flows. With an analysis of the probability of suffering a sudden stop, we test the relevance of prior capital booms. A capital-boom year is a period dominated by short run chartist strategies, as described previously. We find that the probability of a capital boom is significantly in countries that have experienced a capital boom the year before, and that this probability is very similar to the probability of suffering a sudden stop. However, as the capital boom lengthens, the probability of a subsequent sudden stop rises markedly, while the probability that the capital boom will continue drops to zero.

In contrast to other studies such as those by Edwards (2007), Calvo et al. (2004) or Cavallo and Frankel (2004), who attribute to domestic variables the cause of sudden stops, our results indicate

[1] This is an application of Kindleberger's (2005) model of financial crises, where agents are prone to manias, which eventually give way to panics, in markets for specific asset classes.

that sudden stops are downward overreactions to sharp preceding positive overreaction periods. This does not mean that fundamentals are unimportant in preventing a sudden stop episode. In fact, we postulate that large capital inflows can bring about an endogenous change in some macroeconomic variables – e. g., a deterioration of the current account deficit, a sharp appreciation of the real exchange rate, an excessive rise in bank credit to the private non-bank sector, or a progressive mismatch in the balance sheets of firms and banks that borrow in foreign currency. This deterioration in fundamentals caused by large capital booms that cannot be easily absorbed by economies with small financial sectors is what eventually triggers a massive withdrawal of capital.[2] Many of these variables reflecting domestic fundamentals turn out not to be robust in their predictive power and are indeed rendered insignificant when measures of preceding capital booms are incorporated into the econometric analysis. This leads us to posit that large capital inflows are the best predictor of sudden stops in emerging economies.

The rest of the paper is organized as follows. The next section sets forth the definitions of capital boom and sudden stop episodes. Section 3 describes the methodological analysis. Sections 4 and 5 present our main results and some robustness exercises, respectively. Finally, Section 6 provides some discussion and concluding remarks.

2. Definition of boom and sudden stop periods

We use annual data for 42 emerging economies in the period 1976–2003, which includes all of the boom and sudden stop years in recent economic history (with the exception of the booms leading to the recent world financial crisis). Thus the 1976–82 period corresponds to the boom years identified with the recycling of the oil producers' surpluses; 1983–89 coincides with the Latin American debt crisis; 1990–97 is another period of capital boom and financial innovation in lending to and investing in emerging economies; and 1998–2003 is the period after the Asian and Russian financial crises struck. The complete list of countries is shown in the Appendix.

Our definitions of capital boom and sudden stop episodes closely follow the statistical criteria used initially by Calvo et al. (2004) and later by Guidotti et al. (2004), who adapt Calvo et al.'s definition of sudden stops to data with an annual frequency.

2.1. Boom episodes

We define a year of capital boom when the financial account of the balance of payments is one standard deviation above its mean and is at least 5% of the GDP. Thus, there is a capital boom in the year t when $FF_{it} = 1$ according to the following rule:

$$FF_{it} = \begin{cases} 1 & \text{if } F_{it} > \overline{F}_i + \sigma_{F_i} \text{ and } \dfrac{F_{it}}{GDP_{it}} > 5\% \\ 0 & \text{otherwise} \end{cases} \quad (1)$$

where F_{it} is the value of the financial account of country i in year t (current US dollars deflated by the US consumer price index), $\overline{F}_i$ is its mean for the entire period and σ_{F_i} is its standard deviation. By using as our definition of a capital boom a year when capital inflows exceeded by one standard deviation their mean we ensure the unusual character of this episode. The normalization by GDP is used in order to detect surges that represent a large deviation with respect to the country's economic size. We prefer to use the level of capital flows rather than their annual change because our objective is to test for the impact of large levels, not large changes in capital flows. In the 1976–2003 period, there are 152 capital booms (so defined) in the 42 countries in the sample. The Appendix lists these episodes.

[2] A recent discussion of capital flow bonanzas and financial crises can be found in Reinhart and Reinhart (2008), who arrive at similar conclusions as those of this paper. However, they use the current account as a measure of capital movements, while we use the net financial account. These two measures differ, of course, as capital inflows, for example, could be partly absorbed as reserves and not only go to finance the current account. In contrast to Reinhart and Reinhart, who use mostly descriptive statistics, we try to test our hypothesis with a probit model of sudden stops.

2.2. Sudden stop episodes

Following Guidotti et al. (2004), we identify a sudden stop of capital flows when the annual *decline* in the financial account is one standard deviation below its mean and is larger than 5% of GDP. Concretely, a country will suffer a sudden stop in a given year when $SS_{it} = 1$ according to the following rule:

$$SS_{it} = \begin{cases} 1 \;\; if\; \Delta F_{it} < \overline{\Delta F_i} - \sigma_{\Delta F_i} \; and \left|\dfrac{\Delta F_{it}}{GDP_{it}}\right| \geq 5\%, \; whenever\; F_{it-1} > 0 \; and\; FF_{it} = 0 \\ 0 \;\; otherwise \end{cases} \tag{2}$$

where ΔF_{it} is the change in the financial account of country i in year t, $\overline{\Delta F_i}$ is the average change in the financial account of country i over the sample period and $\sigma_{\Delta F_i}$ is its standard deviation. In the case of sudden stops, we are interested not in the absolute value of capital flows but in a significant decline from the preceding year. Again, as with capital booms, the joint condition applied to classify an event as a sudden stop works in the same fashion. Thus, countries with little volatility in capital flows can experience episodes with falling capital inflows (or with capital outflows) which do not have major impacts on their economies; by requiring that the contraction be a certain percentage of GDP, we attempt to guarantee that they are important for the countries experiencing it.[3]

Since our interest is in identifying the start of a contraction in capital inflow, whenever a sudden stop in a particular year is followed by another sudden stop the following year, only the first contraction will be considered to be a sudden stop. As noted in definition (2), we discard episodes which are both sudden stops and capital booms, as per definition (1). In our sample, we found 74 episodes that qualify for sudden stops (7% of the sample). The annual distribution of sudden stops is shown in the Appendix.

A view of these episodes is shown in Fig. 1. The three horizontal lines represent mean capital flows (the broken line) and flows that are one standard deviation above and below the mean. The shadowed region shows the drop in capital flows that corresponds to a sudden stop. These examples suggest that sudden stops are sharp adjustments after periods of consecutive booms.

In Table 1 we show the average contraction of capital flows as a share of GDP occurring two years after a three-year period of capital boom. This contraction is always higher than after a three-year period of positive capital inflows in tranquil times and this difference is significantly different from zero for all the geographical regions considered, with the exception of emerging Europe. Another relevant characteristic is that the average growth rate of GDP two years after a three-year boom is considerably lower than in countries with positive capital inflows for three years but without a boom. Again, this difference is significantly different from zero for all regional groups of countries with the exception of emerging Europe.

3. Probit analysis

Letting Φ be the standard normal distribution, we estimate a panel probit with heterogeneous unobserved effects. For the boom episodes we estimate the following equation:

$$\begin{aligned} \Pr(FF_{it} &= 1/FF_{it-1}, ContFF_{it}, NonFDI_{it-1}, \mathbf{X}_{it-1}, c_i) \\ &= \Phi\Big(\gamma_f FF_{it-1} + \gamma_c ContFF_{it} + \gamma_{nf} NonFDI_{it-1} + \mathbf{X}_{it-1}\beta + c_i\Big) \end{aligned} \tag{3}$$

[3] This definition of sudden stops differs from the one used by Calvo et al. (2004) in that it does not rely on a proxy for capital flows; instead, it uses net capital flows themselves (the financial account of the balance of payments, excluding reserve transactions). In addition, (1) in detecting sudden stops we use annual data rather than monthly data; and (2) our sample includes 42 emerging economies and no developed countries over a long time period (1976–2003), while Calvo et al. (2004) include only 15 emerging economies and some developed countries over a shorter time period (1990–2001). Even so, the sudden stop episodes in Calvo et al. (2004) in practically all cases also show up in our sample. In Section 5 we conduct several robustness exercises, including one in which we use two standard deviations to choose sudden stops and boom episodes, which is the main criterion used by Calvo et al. (2004) to identify sudden stops.

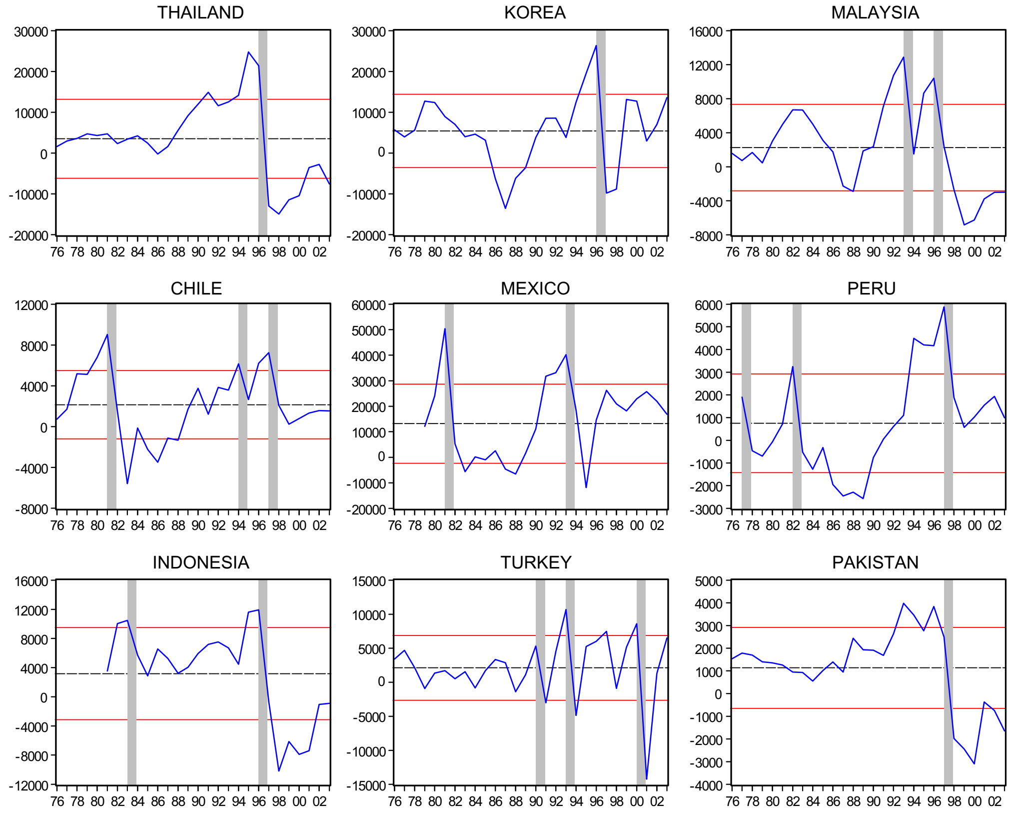

Fig. 1. Booms and sudden stops in capital flows.

ContFF (boom contagion) is a binary contagion variable taking value 1 when the number of boom episodes in a particular year and the year before in other countries of the sample exceeds twice the average annual number of booms. *NonFDI* is non-FDI flows in the financial account as a share of GDP, **X** is a matrix of control variables and *c* is an unobserved country-specific effect.

The variable *FF* lagged one period describes the overreaction (or feedback) effect in euphoric phases. According to Kindleberger (2005), the optimism of investors strengthens during periods of bonanza because of the knowledge that investors have of what other investors are doing. Thus large

Table 1
Average change in the financial account (% of GDP) and GDP growth two years after a period of three-year capital boom, compared with the same variables in countries that did not experience a capital boom.

Emerging country region	Three years with boom		Three years without boom[a]	
	Δ*F*/GDP	ΔGDP/GDP	Δ*F*/GDP	ΔGDP/GDP
South America and Mexico	−3.9* (11)	−1.6* (11)	−1.0 (68)	2.2 (68)
Central America	−5.0* (6)	−0.4* (6)	0.6 (56)	3.6 (56)
Asia	−7.7* (5)	1.6* (5)	−0.0 (131)	5.7 (132)
Africa	−9.4* (7)	1.9* (7)	−0.5 (56)	4.0 (56)
Europe	−2.0 (2)	2.5 (2)	−0.9 (16)	1.1 (18)

Number of episodes shown in parenthesis. *Difference is significant at 5%.
[a] Excluding three years after sudden stops.

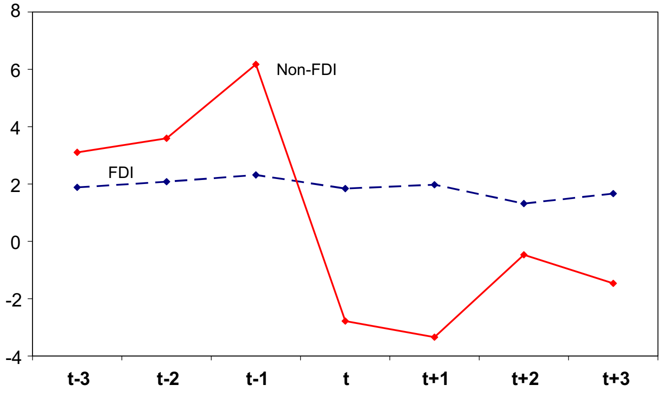

Fig. 2. FDI and non-FDI flows around sudden stops (average flows to GDP ratios). Sudden Stops occur at t.

investments tend to attract further investments, generating a boom that can be self-sustaining for some time. The inclusion of this variable is meant to reflect the chartist strategies that are used by institutional and other investors when capital flows to a particular country or group of countries are large. The inclusion of *NonFDI* is congruent with our theoretical support because these kinds of flows generally have a shorter horizon than FDI and are susceptible to reversal as investors acquire new information. FDI is much less prone to chartist strategies, has longer time horizons, and is not so easily reversed. As can be seen in Fig. 2, non-FDI flows show an increasing trend in years prior to a sudden stop and drop sharply during these events.[4] By contrast, FDI flows exhibit neither surges nor sudden stops around the years identified as being characterized by a sudden stop.

Matrix **X** includes variables that could be interpreted as determinants of capital flows.[5] These are the rate of GDP growth (*RGDP*), the change in the terms of trade (*TT*), the ratio of external debt to exports (*ED/X*), and the current account deficit as a share of GDP (*CAD*). Other variables included refer to domestic or external conditions. The real foreign interest rate (*Rf*) and the rate of growth of G7 countries (*G7gdp*) reflect external conditions affecting capital flows, and the real domestic interest rate (*Rd*) and the fiscal deficit (*Gov_Def*) are domestic fundamentals.

We follow a similar strategy to estimate the probability of suffering a sudden stop

$$\begin{aligned}\Pr(SS_{it} &= 1/FF_{it-1}, ContSS_{it}, NonFDI_{it-1}, \mathbf{X}_{it-1}, c_i) \\ &= \Phi\left(\gamma_f FF_{it-1} + \gamma_c ContSS_{it} + \gamma_{nf} NonFDI_{it-1} + \mathbf{X}_{it-1}\beta + c_i\right) \qquad (4)\end{aligned}$$

This time FF_{t-1} is a proxy for an overreaction that is in need of correction: a period of bonanza is not going to persist forever. In a financial market with many heterogeneous agents, some of them are aware that the high levels of capital inflows are related more to feedbacks from other investors than to economic fundamentals. New information can arise (such as an endogenous worsening of one or more fundamentals), provoking a sharp adjustment. These periods are typically dominated by non-FDI flows; therefore we include this variable in the empirical analysis. As in equation (3), *ContSS* is a binary variable taking value 1 when the number of sudden stops in a particular year and the year before exceeds twice the average annual number of sudden stops in the entire sample.[6]

[4] This is consistent with findings of Levchenko and Mauro (2006), who decompose the flows around sudden stop episodes and show that the most volatile are non-FDI flows.

[5] All variables are from International Monetary Fund, *International Financial Statistics*; and World Bank, *World Development Indicators*. Exact variable definitions are given in the appendix.

[6] For this variable we consider the total number of sudden stops without eliminating a second year of sudden stop as in equation (2). For example, we consider a sudden stop in 1994 and 1995 in Mexico.

We include a contagion dummy in both the capital surge and sudden stop equations. Both positive overreactions and their reversals appear empirically to take place in several countries at the same time. This observation is consistent with our hypothesis that these phenomena originate in international capital markets and are not necessarily a response to changes in fundamentals in all recipient countries. Say, for example, that growth prospects appear to improve in a given emerging country. This may entice foreign investors to place bets on assets not only of that particular country but also on those of other, in some manner similar countries. A good example was the capital surge to all Asian countries before the Asian crisis. Likewise, the probability of a sudden stop occurring in any given country is likely to rise if sudden stops are taking place in other countries at the same time. Again, the Asian crisis, with its string of sudden stops in a large number of countries (Indonesia, Korea, Philippines, and even Singapore and Hong Kong) once capital fled from Thailand in mid 1997 provides a paradigmatic example of large-scale contagion. So do the large inflows into Latin America in the second half of the 1970s and the sudden stops that affected poorly and well-managed countries after Mexico's default in 1982.

Contagion variables have been used in several studies of capital inflows, including Broner and Rigobón (2006), Fiess (2003), and Forbes and Rigobón (2001). Our way of handling this variable is akin to the one used by Broner and Rigobón (BR), except that we generalize the possibility of contagion. Whereas BR define contagion as a regional phenomenon, we detect contagion more generally in emerging markets as a whole, thus allowing events like the Russian crisis of 2008 to affect a far-flung economy such as Brazil's.

This variable attempts to capture the fact that large and highly leveraged investors, when faced with a sudden decline in their portfolio of assets of a given country, are forced to sell those of other countries in their portfolio in order to meet increased collateral requirements. These sales can lead other investors to mistake them for a sign that fundamentals are deteriorating in the country experiencing these liquidations; in turn, this second group of investors can exacerbate the outflows by making similar decisions.[7] In extreme cases, rumors in financial markets, even without firm evidence, are enough for a group of uninformed investors to follow the lead of some players who are selling for reasons unrelated to deteriorating fundamentals. These collective actions, also know as herd behavior, reinforce the waves of euphoria during bonanzas and exacerbate the panic that characterizes financial crises.

Matrix **X** includes variables that have been used in the literature on balance-of-payment crises and determinants of sudden stops. The most frequently used and most successful variable has been the current account deficit, *CAD*. Furthermore, we use an indicator of banking crises (*bankcrises*) with data from Caprio and Klingebiel (2003) and another of exchange rate rigidity (*EXR*) from Levy-Yeyati and Sturzenegger (2005) in order to test the hypothesis that sudden stops are more likely in countries with fixed rather than flexible exchange rate regimes. Large levels of external debt to exports (*ED/X*) may also raise the probability of a sudden stop. Other variables found significant in other studies are liability dollarization (*dollarization*, external liabilities of the financial sector as a percentage of M2) and economic openness (*openness*, exports plus imports as a share of GDP). Both are used in our estimations. In addition, in some specifications we use real exchange rate depreciation (*RER*), the ratio of M2 to GDP (*M2/GDP*), the change in the terms of trade (*TT*) and the change of reserves (*Reserves*) to control for possible signals that may generate a stampede by investors. As in the model of capital booms, external variables (*Rf*, *G7gr*) and domestic fundamentals (*Rd*, *Gov_Def*) are also included.

We estimate (3) and (4) separately using random effects and, following Wooldridge (2002), we report the average marginal effect given by:

$$\frac{\partial E[P(y = 1/\mathbf{X}, c)/c]}{\partial X_j} = \frac{\partial \Phi(\mathbf{X}\beta/\sigma)}{\partial X_j} = (\beta_j/\sigma)\phi(\mathbf{X}\beta/\sigma) \quad (5)$$

For notational simplicity we have suppressed both cross-section and time-series indicators; y indicates the endogenous variable (*FF* or *SS*) and matrix $\boldsymbol{X}$ includes all variables in the right hand side of (3) or (4).

[7] As in other parts of this paper, the reader will no doubt see the footprints of the theory of decisions under asymmetric information, a necessary ingredient in the overreaction hypothesis.

Table 2
Probability of occurrence of a capital boom. Dependent Variable FF.

	(1)	(2)
FF_{t-1}	12.514 (4.29)***	11.913 (3.74)***
CONTFF	5.617 (3.15)***	4.282 (2.22)**
NonFDI	0.393 (2.08)**	0.162 (0.83)
RGDP	0.976 (4.05)***	0.655 (2.51)**
CAD	1.091 (4.20)***	1.185 (3.85)***
TT	0.167 (3.56)***	0.154 (1.52)
ED/X	−6.440 (4.81)***	−5.225 (3.60)***
Rf		−0.629 (1.93)*
G7gdp		−1.773 (2.04)**
Gov_Def		−0.498 (1.74)*
Rd		0.029 (1.09)
Observations	941	726

Average marginal effects (times 100) are reported for all regressors. Constants omitted. Figures in parenthesis are z statistics with robust standard errors. All regressors are lagged one period, with the exception of CONTFF. * significant at 10%; ** significant at 5%; *** significant at 1%.

Variable c has a conditional distribution $c/\mathbf{X} \sim N(0, \tau^2)$ so that $\sigma = (1+\tau^2)^{1/2}$. ϕ represents the standard normal density.

Since the model of equation (3) is a dynamic panel, we require additional assumptions. In order to report consistent estimators, we cannot use the first difference of the dependent variable – a very popular procedure in linear models – because the standard normal distribution is a highly nonlinear function. We follow Wooldridge (2002, 2005) and propose the following distribution for c_i[8]:

$$h(c_i/y_{i0}, \mathbf{X}_i, \delta) = \psi + \xi_0 y_{i0} + \overline{\mathbf{X}}_i \xi + a_i \quad with\ a_i \sim N\left(0, \sigma_a^2\right) \tag{6}$$

where i indicates cross-section units, y_{i0} is the initial value of the dependent variable, and $\overline{\mathbf{X}}_i$ is a matrix with the average value for each explanatory variable. Including assumption (6) in the estimation of equation (3) implies adding to the estimating equation the average value of the explanatory variables and the initial value of the dependent variable.[9]

4. Main results

Table 2 shows the results for the estimation of equation (3). In column (1) all the variables employed are significant at least at the 5% level and have the expected signs. Our lagged variable of capital booms is very significant and shows the highest marginal effect. If the previous year the economy was undergoing a boom episode the probability that this boom will persist the next year increases by 13%. This result is congruent with the feedback forces identified by Kindleberger and the strategies and transmission mechanisms described in the behavioral finance literature.[10]

[8] Wooldridge's (2005) approach is to model the distribution of the unobserved effect conditional on some functional form of the initial value of the dependent variable and any exogenous variables. He shows that average partial effects are consistent and that this does not depend on the choice of the distribution of the unobserved effects. The assumption of a normal distribution is suggested by practical convenience in a probit model.

[9] Using the same notation as in equation (6), we can write the latent variable in the probit model (3) as $y_{it}^* = \gamma_f y_{it-1} + \mathbf{X}_{it-1}\beta + c_i + u_{it}$. When combined with equation (6), the latter can be expressed as: $y_{it}^* = \gamma_f y_{it-1} + \mathbf{X}_{it-1}\beta + \psi + \xi_0 y_{i0} + \overline{\mathbf{X}}_i \xi + a_i + u_{it}$, where $u_{it} \sim N(0,1)$. This allows for a traditional probit estimation. In order to model idiosyncratic heterogeneity, we choose variables that are constant in time, which we build by averaging the regressors in the principal equation. For the sake of clarity, in the results we report neither the coefficients attached to the averages of these variables (three of them found significant) nor the coefficient of the initial value of the dependent variable.

[10] See Shiller (2003) or Barberis and Thaler (2003) for a review of this literature.

Contagion from other countries is another relevant variable, raising the probability of a boom episode by 6%. Furthermore, large non-FDI flows, a high growth rate of GDP and a positive terms-of-trade shock raise the probability of a capital-boom episode the next year, although their marginal effects are small. The external-debt-to-exports ratio emerges as an important variable discouraging booms and, unexpectedly, the current account deficit has a positive sign. This result seems to indicate that the current account deficit works as a proxy for capital flows to the country.

In column (2) of Table 2 we add external and domestic variables. As expected, falls in the international interest rate and in the growth rate of G7 countries increase the probability of a capital boom, whereas wider fiscal deficits reduce it. Changes in the terms of trade and the ratio of non-FDI flows to GDP are not robust to the inclusion of other relevant variables.

Table 3 shows the results for the estimation of equation (4). We progressively include variables in succeeding columns and exclude others to avoid inference problems from irrelevant variables. A capital boom in the preceding period is a strong predictor of a sudden stop, its effect is the largest of any of the explanatory variables included (increasing the probability of a sudden stop by around 9%), and it is robust to the inclusion of other variables. This result is interesting because it is achieved conditioning to the effects of other variables or fundamentals that can be in turn affected by the capital flow bonanzas. Therefore, it appears to be a good test of the hypothesis of adjustment caused by a previous upward overreaction in capital flows to emerging markets.

Other variables that turn out to be significant and robust are: contagion, the ratio of non-FDI flows to GDP, the current account deficit as a share of GDP, and the external-debt-to-exports ratio. International contagion raises the probability of a sudden stop by about 3%. All significant variables have the expected signs.

4.1. A longer capital-boom period

The probability of a capital boom does not rise significantly as the boom lengthens; however, the probability of suffering a sudden stop increases dramatically with the length of the preceding boom. Table 4 summarizes the marginal effects that are significant for similar specifications as those in Tables 2 and 3, but lengthening the boom period by one year from one column to the next. Thus columns (1) and (4) show the results of estimating equations (3) and (4), respectively, with a two-year boom period.

Table 3
Probability of occurrence of a sudden stop. Dependent variable SS.

	(1)	(2)	(3)	(4)	(5)
FF_{t-1}	9.148 (4.25)***	5.663 (2.90)***	9.333 (3.89)***	8.638 (3.89)***	9.595 (4.07)***
CONTSS	2.798 (2.33)**	2.990 (2.30)**	3.051 (2.26)**	2.611 (2.02)**	2.340 (1.70)*
NonFDI	0.369 (3.18)***	0.594 (4.54)***	0.491 (3.45)***	0.553 (3.71)***	0.627 (4.31)***
CAD	0.472 (3.60)***	0.361 (2.39)**	0.355 (2.26)**	0.287 (1.77)*	0.192 (1.24)
EXR		−0.250 (0.61)			
Bankcrises		0.318 (0.14)			
ED/X		0.822 (1.97)**	0.943 (2.21)**	0.967 (2.16)**	0.867 (2.05)**
TT			0.055 (1.48)		
Dollarization			0.000 (0.26)		
Openness				0.017 (0.82)	
Reserves				−0.008 (0.96)	
M2/GDP				−0.022(0.69)	
Rf					0.011 (0.06)
G7gdp					−0.704 (1.19)
Gov_Def					0.061 (0.47)
Rd					0.004 (0.47)
Observations	1070	893	875	958	856

Average marginal effects (times 100) are reported for all regressors. Constants omitted. Figures in parenthesis are z statistics with robust standard errors. All regressors are lagged one period, with the exception of CONTSS. *significant at 10%; ** significant at 5%; *** significant at 1%.

Table 4
Probit estimations with an extended period of capital boom.

Explanatory variables	FF (1)	FF (2)	FF (3)	SS (4)	SS (5)	SS (6)
$FF_{t-1 \text{ to } t-2}$	2.2			[7.0***, 9.3***]		
$FF_{t-1 \text{ to } t-3}$		−4.3**			[11.6***, 18.9***]	
$FF_{t-1 \text{ to } t-4}$			−2.3			[14.5*, 26.7*]
CONT[a]	4.9***	4.8***	5.1***	[2.1*, 2.9**]	[2.4*, 2.8**]	[2.5**, 2.9**]
$NonFDI_{t-1}$	0.4**	0.4**	0.5***	[0.6***, 0.9***]	[0.7***, 0.8***]	[0.7**, 0.8***]
CAD_{t-1}	1.3***	1.2***	1.1***	[0.3**, 0.5***]	[0.3*, 0.5***]	[0.3**, 0.5***]
ED/X_{t-1}	−5.4***	−4.9***	−5.3***	[0.7*, 0.8*]		
$RGDP_{t-1}$	0.6**	0.6**	0.8***			
$G7gdp_{t-1}$	−1.7**	−1.5**				
Rf_{t-1}	−0.6**	−0.5*	−0.9***			
Gov_Def_{t-1}	0.5**	0.7***				
Rd_{t-1}		0.0**				

Table reports significant marginal effects (times 100) only. Figures in brackets are the extreme values of the estimated coefficients. * significant at 10%; ** significant at 5%; *** significant at 1%.
[a] The contagion variable is defined for FF when the results are for capital booms and for SS when the results are for sudden stops.

This means that the condition for the existence of a capital boom according to rule (1) is fulfilled in both of the immediately preceding years, in which case a dummy variable takes the value of unity in the regression. In columns (2) and (5) the boom is lengthened to three years; now the capital boom defined by rule (1) must be fulfilled the three preceding years. Columns (3) and (6) shows the results for a four-year boom period, defined in a similar manner. The results support the hypothesis that corrections to overreactions will become increasingly likely the longer the overreaction has been going on. If a capital boom has continued for a period of four years, the probability of a sudden stop rises to a very large 27%.

5. Some robustness tests

In order to test the robustness of the results, we change the threshold of 5% of GDP in rules (1) and (2) to 3% and 7%. Furthermore, following Faucette et al. (2005) and Rothenberg and Warnock (2006), we use only gross flows (liabilities) instead of net flows to construct the capital boom and sudden stop variables. The results are reported in Tables 5 and 6. Finally, Table 6 shows two additional definitions for sudden stops. First, in order to test whether our results are sensitive to the change in the sudden stop definition as regards the one used by Calvo et al. (2004), *SS2std* changes rule (2) using two standard deviations instead of only one and reestimates the probit regressions using, in addition, two standard deviations in the construction of the capital-boom variable according to rule (1). Second, we name *SSgdp* a second definition requiring, in addition to the conditions specified in rule (2), a fall in GDP during the year of the sudden stop or a year later. *SSgdp* reflects capital flight episodes that have had a large effect on the real sector.

Table 5
Some robustness exercises for capital-boom estimations.

Explanatory variables	3%	7%	FFgross[a]
FF_{t-1}	10.5***	11.9***	10.5***
CONTFF	5.7**		4.1*
$NonFDI_{t-1}$			0.4**
CAD_{t-1}	1.1***	1.1***	1.1***
$RGDP_{t-1}$	0.7**	0.5**	
ED/X_{t-1}	−5.9***	−4.5***	−5.6***
Rf_{t-1}	−0.9**		
$G7gdp_{t-1}$	−2.7***		−2.1**
Gov_Def		−0.5**	
Rd_{t-1}	0.05*		

Table reports significant marginal effects (times 100) only. * significant at 10%; ** significant at 5%; *** significant at 1%.
[a] Indicators of capital boom, contagion and non-FDI flows are created using gross flows only.

Table 6
Some robustness exercises for sudden stop estimations.

Explanatory variables	3%	7%	SSgross[a]	SS2std[b]	SSgdp
FF_{t-1}	[10.5***, 12.9***]	[5.2***, 7.5***]	[11.7***, 14.8***]	[9.8***, 14.6***]	[5.1***, 6.2***]
CONTSS	[3.1**, 4.0***]				[1.6*, 2.6***]
$NonFDI_{t-1}$	[0.4***, 0.7***]	[0.3***, 0.3***]	[0.1**, 0.3***]	[0.2***, 0.3***]	[0.1*, 0.2***]
CAD_{t-1}	[0.3*, 0.4***]	[0.2***, 0.3**]	[0.5***, 0.6***]	0.2**	[0.2**, 0.3***]
ED/X_{t-1}	[0.9*, 1.0**]	[0.5**, 0.7**]			[0.5*, 0.8***]
EXR_{t-1}		[−0.4*, −0.6**]		[−0.4*, −0.5**]	
$Dollarization_{t-1}$		[0.0**, 0.0***]			0.0**
$Reserves_{t-1}$		[−0.02**, −0.02***]			
Rf_{t-1}				[0.1*, 0.2**]	0.3**
Rd_{t-1}					[0.0*, 0.0**]

Table reports significant marginal effects (times 100) only. Figures in brackets are the extreme values of the estimated coefficients. * significant at 10%; ** significant at 5%; *** significant at 1%.
[a] Indicators of sudden stop, capital boom, nonFDI flows and contagion are created using gross flows only.
[b] Indicators of sudden stop, capital boom and contagion are created using two standard deviations from the historical mean in rules (1) and (2) of the text.

The construction of these new variables yields some important measurements. One of them is the relevance of gross flows in the episodes of capital boom or sudden stop reported above. When they are decomposed into gross inflows and outflows, we find that 72% of the capital-boom episodes defined with net flows coincide with booms in gross flows. On the other hand, 65% of the sudden stop episodes defined with the use of net flows corresponded to sudden stops using gross flows. Finally, 58% of sudden stops were associated with falling GDP in the year the sudden stop took place or the following year.

Table 5 reports the marginal effects of probit estimations for capital-boom episodes. The effect of a prior capital boom is similar to that shown in Table 2 and very significant; therefore, our prior conclusions regarding the sources of a capital boom still hold. Some variables such as *Rf*, *G7gdp* and *Rd* are not relevant when we define a more extreme capital-boom episode; by contrast, the fiscal deficit, *Gov_Def*, becomes significant only when the threshold for booms is raised. As shown in the last column of Table 5, contagion and non-FDI flows are not significant determinants in extreme boom episodes, but they are significant when we use gross rather than net flows. Gross flows seem to be affected by overall growth in developed countries as well: a drop in the rate of growth in the G7 countries raises the probability of a capital boom in emerging markets.

Table 6 shows that our main variables are still significant using different definitions of sudden stops, supporting our conclusions described in the previous section. The prior boom of capital flows and its composition are very important in predicting a sudden stop. International contagion helps to account for a sudden stop episode, although it loses its relevance when a more extreme fall is required (7% of GDP or 2 standard deviations) or when gross flows are used instead of net flows. The domestic variable that is important in every case is the current account deficit (CAD), supporting previous studies on the subject.

New variables appear to be significant in a sudden stop with a sharper decline in capital flows represented by the increase of the threshold to 7% of GDP. These include liability dollarization, the change in reserves, and the exchange rate regime. With the exception of the exchange rate regime, all show the expected sign.[11] The results are very similar when one uses two standard deviations in the definition of sudden stops (and capital booms). The marginal effect of the capital boom is very close to those shown previously in the table, with non-FDI flows and the current account deficit (as a share of GDP) continuing to be good predictors of a sudden stop. In this case, the international interest rate is

[11] The negative sign of *EXR* in Table 6 indicates that a more rigid regime reduces the probability of suffering an extreme sudden stop, which is contrary to the conventional view. The same result is obtained when the variable used to measure sudden stops is *SS2std*. However, this can be an ambiguous result. We use the 1–5 classification of regimes of Levy-Yeyati and Sturzenegger (2005), where 1 is totally flexible and 5 totally fixed. In this classification, a floating regime is associated with the lowest number of sudden stops. However, their number is not very different from those of other regimes, and the maximum number of sudden stops is not associated with fixed exchange rate regimes.

Table 7
Probit estimations on SSgdp with an extended period of capital boom.

Explanatory variables	SSgdp (1)	SSgdp (2)	SSgdp (3)
$FF_{t-1 \text{ to } t-2}$	[5.5***, 9.4***]		
$FF_{t-1 \text{ to } t-3}$		[8.0***, 18.9***]	
$FF_{t-1 \text{ to } t-4}$			[20.1***, 34.5***]
CONTSS	[1.6*, 2.3**]	[1.6*, 2.7**]	[1.6*, 2.5***]
$NonFDI_{t-1}$	[0.2***, 0.3***]	[0.3***, 0.7***]	[2.8**, 3.2**]
CAD_{t-1}	[0.2*, 0.3***]	[0.2**, 0.4**]	[0.2*, 0.4**]
ED/X_{t-1}	[0.5*, 0.8**]	[0.6**, 0.7***]	[0.5**, 0.6*]
Rd_{t-1}			0.0**

Table reports significant marginal effects (times 100) only. Figures in brackets are the extreme values of the estimated coefficients. * significant at 10%; ** significant at 5%; *** significant at 1%.

a robust variable explaining sudden stops in all the regressions. A previous capital boom, international contagion, and non-FDI flows are robust in predicting a sudden stop with negative real effects on GDP growth, *SSgdp*. An increase in the external-debt-to-exports ratio, and not just in the current account deficit, also appears to be a signal that could generate a reversion in capital flows. In one run, rising liability dollarization and increases in the foreign real interest rate significantly raise the probability of *SSgdp*. Unexpectedly, rather than moderating capital outflows (or dampening the fall in inflows), increases in domestic real interest rates have a positive impact on *SSgdp*. This result could be indicating that investors, faced with very adverse domestic conditions, view higher domestic interest rates as a symptom of further trouble down the road.

As a capital boom lengthens, the likelihood of a sudden stop rises even more sharply when the sudden stop is defined to be accompanied by a fall in GDP. As shown in Table 7, the probability of a sudden stop with a fall in GDP increases to 35% when a boom has gone on for a period of four years.

Another robustness test was undertaken using the early-warning-signal literature, as in Kaminsky et al. (1998). The capital-boom indicator may work as a signal, and the fact that it is a binary variable may enhance its importance in the probit estimations as compared to other explanatory variables, which are measured in a continuous way. For this reason, we take the current account deficit (the most robust domestic variable in previous estimations) and create a signal akin to the binary capital-boom variable of rule (1), naming it *S1CAD*. In addition, we create another indicator based on the percentile of the current account deficit that minimizes the noise-to-signal ratio, as calculated in Kaminsky et al. (1998). This optimal threshold is the highest fifth percentile; in other words, the largest fifth-percentile current account deficit minimizes this noise-signal ratio.[12] We name this variable S2CAD.

Tables 8 and 9 show the results of probit estimations for both indicators of the current account deficit. We use three definitions of sudden stop: *SS*, *SSgdp*, and *SSgross*. Tables 8 and 9 indicate that including these indicators does not add relevant information to the one yielded by the capital-boom variable, contagion, nonFDI flows, the current account deficit as a share of GDP measured in a continuous way, and the external-debt-to-exports ratio. In some cases when these indicators replace the continuous current account deficit variable, they show significant marginal effects, but these effects are lower than those associated with the capital-boom variable.

Finally, we use the two-step procedure of Rivers and Vuong (1988) to discard any endogeneity problems that may remain between capital booms and subsequent sudden stops, even in spite of the fact that the capital-boom variable is lagged one period in the equations explaining sudden stops. This test consists in including the errors of the estimation of the equation for capital booms in the

[12] This threshold looks for balancing the risk of having a wrong signal when a crisis does not take place with the risk of having no signal when a crisis does occur. The threshold is chosen to minimize [B/(A + B)]/[D/(C + D)], according to the following chart:

		$Signal_{t-1}$	
		No	Yes
SS_t	No	A	B
	Yes	C	D

Table 8
Probability of occurrence of a sudden stop including a "signal" of the current account deficit.

	(1) SS	(2) SSgdp	(3)[a] SSgross	(4) SS	(5) SSgdp	(6)[a] SSgross
$S1CAD_{t-1}$	1.867 (0.96)	0.946 (0.73)	4.868 (1.88)*	4.070 (2.17)**	2.359 (1.81)*	8.930 (3.70)***
FF_{t-1}	8.204 (3.80)***	4.880 (3.15)***	14.699 (5.57)***	8.716 (3.92)***	5.538 (3.31)***	15.873 (5.91)***
CONTSS	3.137 (2.42)**	2.184 (2.42)**	0.132 (0.10)	3.321 (2.51)**	2.307 (2.47)**	0.182 (0.13)
$NonFDI_{t-1}$	0.493 (3.77)***	0.189 (2.10)**	0.098 (2.14)**	0.596 (4.32)***	0.227 (2.31)**	0.113 (2.26)**
CAD_{t-1}	0.268 (1.62)	0.155 (1.42)	0.310 (1.72)*			
ED/X_{t-1}	0.819 (2.12)**	0.726 (3.16)***		0.989 (2.59)***	0.842 (3.64)***	
Observations	1006	1007	1067	1006	1007	1067

Average marginal effects (times 100) are reported for all regressors. Constants omitted. Figures in parenthesis are *z* statistics with robust standard errors. All regressors are lagged one period, with the exception of CONTSS. * significant at 10%; ** significant at 5%; *** significant at 1%.
[a] Indicators of sudden stop, capital boom, contagion and nonFDI flows are created using gross flows only.

Table 9
Probability of occurrence of a sudden stop including a "signal" of the current account deficit.

	(1) SS	(2) SSgdp	(3)[a] SSgross	(4) SS	(5) SSgdp	(6)[a] SSgross
$S2CAD_{t-1}$	0.661 (0.34)	1.169 (0.79)	4.080 (1.45)	2.636 (1.20)	2.480 (1.53)	6.923 (2.45)**
FF_{t-1}	8.292 (3.87)***	4.880 (3.16)***	14.783 (5.59)***	9.409 (4.17)***	5.821 (3.41)***	15.107 (5.44)***
CONTSS	3.094 (2.41)**	2.192 (2.43)**	0.160 (0.12)	3.381 (2.54)**	2.342 (2.49)**	0.683 (0.49)
$NonFDI_{t-1}$	0.484 (3.77)***	0.189 (2.20)**	0.093 (2.03)**	0.644 (4.54)***	0.245 (2.54)**	0.388 (2.94)***
CAD_{t-1}	0.351 (2.31)**	0.168 (1.64)*	0.420 (2.47)**			
ED/X_{t-1}	0.783 (2.07)**	0.717 (3.22)***		1.033 (2.70)***	0.858 (3.67)***	
Observations	1006	1007	1067	1006	1007	1067

Average marginal effects (times 100) are reported for all regressors. Constants omitted. Figures in parenthesis are *z* statistics with robust standard errors. All regressors are lagged one period, with the exception of CONTSS. * significant at 10%; ** significant at 5%; *** significant at 1%.
[a] Indicators of sudden stop, capital boom, contagion and nonFDI flows are created using gross flows only.

Table 10
Rivers and Vuong (1988) test for the null hypothesis that capital boom and sudden stop errors are not correlated in expression (4).

	(1) SS	(2) SS	(3) SS	(4) SS	(5) SS
Residuals FF_{t-1}	0.457(0.98)	−0.153 (0.31)	0.196 (0.40)	0.219 (0.44)	0.083 (0.17)

z statistics are in parenthesis. The estimations of Table 3 are repeated including the residuals of capital boom equation (2) obtained from Table 2.

estimation of the equation for sudden stops and testing for their significance. Table 10 shows the results obtained by including the errors of the estimation of the equation reported in Table 2 in the specifications of the equations reported in Table 3. The results show that it is not possible to reject the null that the errors are equal to zero; in other words, there is no evidence that both previous capital surges and sudden stops are determined simultaneously.

6. Discussion and concluding remarks

There is a large and growing literature on what triggers a sharp contraction in capital flows to emerging markets. The current account deficit, liability dollarization, or excessive credit expansion are some of the variables that figure prominently in this literature. However, sudden stops have not been seen as a consequence of a previous period of overreaction in international financial markets. Capital booms are episodes of excessive enthusiasm that are unwarranted by fundamentals. They also show in a very graphic way that chartist strategies rather than strategies based on future expectations of fundamentals dominate financial markets. In this sense, a capital boom will almost inevitably lead eventually to a sharp and sudden contraction. This means that deteriorating fundamentals are not always necessary to trigger a reversion of positive expectations; rather, it can be a rumor that disheartens the apparent optimism in a particular country, or international contagion that has little or no relationship with domestic conditions. An alternative explanation is that large capital inflows that are not easily (and productively) absorbed into the domestic economy induce a deterioration in one or more fundamentals, which function as a negative signal to investors. Recent studies of herd behavior in financial markets show that periods of overoptimism are fragile and can be suddenly reversed when participants face new information. Our application to capital flows to emerging markets confirms the overreaction hypothesis and its predictive power.

Using other arguments of behavioral finance, one can predict that the reversion of capital flows will be sharper and shorter than the preceding bonanza. One example of such analyses is the loss-aversion hypothesis of Kahneman and Tversky (1979): faced with possible losses, investors will unload emerging market assets more quickly than they accumulated them during the boom. Unambiguously, if the recipient country faces a deterioration of its fundamentals, the probability of a quick reversion in capital flows can be very high.

What are the policy implications of our analysis? Clearly, emerging countries contemplating integration into international financial markets should take into account that they may face a new source of volatility and should tread carefully in this new world.

Appendix

List of emerging countries

Argentina, Bangladesh, Barbados, Belize, Bolivia, Brazil, Chile, China, Colombia, Cote d'Ivoire, Costa Rica, Ecuador, Egypt, El Salvador, Philippines, Guatemala, Hungary, India, Indonesia, Iran, Jamaica, Jordan, Kenya, Korea, Mali, Malaysia, Malta, Morocco, Mauritius, Mexico, Nigeria, Peru, Pakistan, Panama, Paraguay, Poland, Dominican Republic, South Africa, Thailand, Tunisia, Turkey, and Uruguay.

Capital Booms (FF) 1976–2003[a]

1976	BRA	POL	MAR	TUN								
1977	CRI	MAR	TUN									
1978	BOL	BRA	CRI	CIV	PAK	PRY	BGD	SLV	JOR	KEN	MAR	TUN
1979	CRI	CIV	NGA	PRY	URY	KEN	MLI	PAN	EGY			
1980	CHI	CRI	CIV	ECU	PRY	URY	BGD	DOM	KEN	MLI		
1981	BOL	CHI	CIV	MEX	NGA	PRY	URY	BGD	BRB	EGY		
1982	CRI	IDN	NGA	PER	URY	EGY						
1983	IDN	NGA										
1984	JAM											
1985												
1986												
1987												
1988	MUS											
1989	KEN											
1990	MUS											
1991	IRN	MEX	THA	JOR								
1992	IRN	MYS	MEX									
1993	ARG	HUN	IRN	MYS	MEX	PAK	TUR	TUN				
1994	ARG	CHL	CHN	PAR	PAK	PHL	THL	MLT	TUN			
1995	BRA	CHN	COL	HUN	IDN	MYS	PER	PHL	POL	THA		
1996	BRA	CHI	CHN	COL	IDN	KOR	MYS	PAK	PER	PHL	THA	
1997	ARG	BOL	CHI	COL	PER	PHL	SLV	PAN	ZAF			
1998	ARG	BOL	HUN	POL	SLV	GTM	MLT	PAN				
1999	ARG	BOL	HUN	POL	DOM	MLT	PAN					
2000	HUN	POL	BRB	DOM	GTM	JAM	MLI	MUS				
2001	BRB	BLZ	DOM	GTM	JAM	PAN						
2002	BLZ	GTM	JAM									
2003	HUN	BRB	BLZ	SLV	MLI							

[a] We use country abbreviations from World Development Indicators.

Sudden Stops (SS) 1977–2003[a]

1977							
1978	PER						
1979	SLV	MAR	TUN				
1980	BOL	GTM	PAN				
1981	CRI	KEN	POL				
1982	BOL	CHL	MEX	BRB	MLI		
1983	BRA	CIV	ECU	PER	PHL	URY	TUN
1984	IDN	NGA	BRB	GTM			
1985	BOL	PRY	JAM				
1986							
1987	MLI						
1988	PRY						
1989	ARG	MLI					
1990	KEN	EGY					
1991	TUR						
1992	BRB	JOR	KEN				
1993							
1994	HUN	MYS	MEX	POL	TUR	BLZ	
1995	CHL	MLT	MAR				
1996	HUN						
1997	IDN	KOR	MYS	THA	MLI		
1998	CHL	PAK	PER	PHL			
1999	COL	ECU	IRN	NGA			
2000	CRI	MLT	PAN				
2001	ARG	TUR	MUS				
2002	URY	BRB	DOM	PAN			
2003	BOL	JAM					

[a] We use country abbreviations from World Development Indicators.

Definition of variables

Variable	Definition	Source
Capital flows	Financial account deflated by the US consumer price index, 2000 = 100	International Financial Statistics (IFS)
GDP	Gross domestic product	World Development Indicators (WDI)
Current account to GDP, *CAD*	Measured as deficit	WDI
Non-FDI flows to GDP, *NonFDI*	Sum of portfolio flows, other investment and financial derivatives, as share of GDP	IFS, WDI
External-debt-to-exports ratio, *ED/X*	Ratio of public and private external debt (long- and short-term) to exports of goods and services	WDI
Terms of trade, *TT*	Ratio of export to import deflators, both obtained from real and nominal trade data.	WDI
Real exchange rate, *RER*	Ratio of US consumer price index multiplied by nominal exchange rate to domestic consumer price index	IFS
Foreign real interest rate, *Rf*	Three-month US-dollar LIBOR, deflated by US consumer prices	IFS
Domestic real interest rate, *Rd*	Deposit money market rate adjusted for consumer price inflation	IFS
GDP growth of G7 countries, *G7gr*	Simple average of annual growth rate of real GDP of G7 countries	WDI
Fiscal deficit, *Gov_Def*	Measured as deficit	IFS
Banking crises, *bankcrises*	Binary variable taking value 1 during a year of banking crises	Caprio and Klingebiel (2003)
Exchange rate regime, *EXR*	1–5 index according to exchange rate rigidity. 5 indicates a fixed regime	Levy-Yeyati and Sturzenegger (2005)
Openness	Exports plus imports as a share of GDP	WDI
Dollarization	External liabilities of financial sector as a percentage of money	IFS
Reserves	International reserves	IFS
M2 to GDP, *M2/GDP*	M2 as a percentage of GDP	IFS

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