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# Sudden stops of capital flows: Do foreign assets behave differently from foreign liabilities?



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## ABSTRACT

We study the determinants of sudden stops in capital flows to emerging markets. Using gross international asset and liability flows (from the point of view of domestic residents), we identify three types of situations: countries that do not experience any type of sudden stops; those who experience a sudden stop in inflows (liabilities), but no sudden stop in their net financial account of the balance of payments; and countries who suffer a sudden stop in inflows and in their net financial account. Based on these three events, we estimate a multinomial logit model and obtain two important results. We find that developed countries have about the same probability of experiencing sudden stops in gross capital inflows as emerging economies. Moreover, the probability of experiencing a sudden stop in gross inflows that winds up becoming a sudden stop in the financial account is affected by the behavior of a country's international assets: countries whose agents possess assets abroad tend to repatriate them during periods of sudden stops in inflows, while the economies of countries whose agents do not possess foreign assets are much more sensitive to the behavior of foreign investors: a sudden stop in inflows can have very adverse effects on output and employment.

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## 1. Introduction

The world economy has experienced a growing process of financial liberalization and integration during the past 20 years. While foreign capital flows generate clear benefits for the recipient economies, it is also true that the sudden interruption of inflows, or outright outflows of foreign capital, i.e., a sudden stop in the financial account, generally have very adverse consequences for the real sector of an economy experiencing these phenomena (Mendoza, 2010; Bordo et al., 2010). Therefore, understanding the behavior of capital flows has become an urgent need for policymakers and has attracted considerable academic interest.

This paper contributes to the literature on the subject by identifying the variables that affect the probability of a country experiencing a sudden stop in its financial account. While this question has been studied exhaustively in the literature (see Agosin and Huaita (2012), and the references cited therein), the original contribution of this paper is to examine separately the behavior of changes in foreign liabilities of residents (capital inflows and repatriations by foreign investors) and in for-

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eign assets of residents (capital outflows and repatriations by residents). We distinguish between two observations. First, a sudden stop in the capital belonging to international investors (inflow sudden stops, ISS) may not translate into a sudden stop in the entire financial account (financial account sudden stops, FASS), since it could be accompanied by a largely simultaneous repatriation of assets held abroad (i.e., reversals of past outflows) by residents, thus counteracting the sudden interruption of inflows by foreigners or outright declines in foreign capital in the domestic economy. Second, some ISS end up becoming FASS, because the repatriation of capital held abroad by residents does not counteract the ISS.

Additionally, we identify which explanatory variables are relevant in the explanation of the probability of experiencing a sudden stop in inflows that winds up affecting adversely the entire financial account. We arrive at two important results. Being an advanced economy does not make a difference with respect to the probability of experiencing an ISS; in fact, if one analyzes ISS, one finds that, on average, during the sample period, advanced economies and emerging ones have the same number of ISS episodes (two per country). Moreover, the probability of an ISS ending up as a FASS is explained by the behavior of the foreign assets of residents. Generally, advanced economies have more foreign assets than emerging economies; however, agents from some emerging economies have amassed significant foreign assets. Some of these are public (sovereign wealth funds belonging to Ministries of Finance or Central Banks, and foreign exchange reserves of Central Banks) and others are private (pension funds and insurance companies). In this paper we are interested in the existence (or lack thereof) of comovement between the change in foreign liabilities and foreign assets of an economy and its probable determinants.

In fact, we find that the larger is that comovement, the lower is the probability that an ISS will wind up becoming a FASS. The intuition behind this result is that a higher correlation between gross outflows and gross inflows implies that there is a likelihood that when foreign liabilities rise, so will foreign assets; and when there is a retrenchment in foreign capital, this is likely to be compensated by a repatriation of foreign assets, protecting the country from the adverse consequences of an ISS. For small and financially open economies, this may be crucial in avoiding a domestic recession whenever international financial markets are in a risk-off mode.

To fix ideas with respect to the economic mechanism behind the correlation that may exist between changes in international assets and liabilities, one might think of the following hypothesis. When a country suffers, for exogenous reasons, an ISS, it will experience two impacts that are relevant for this discussion: if the country is, for the sake of argument, on a flexible exchange rate regime, its nominal exchange rate will depreciate; and domestic asset prices will fall in both domestic and foreign currency.<sup>1</sup> If the domestic investors of the country experiencing the ISS have previously invested in foreign assets, the currency-depreciation-cum-domestic-asset price declines could create significant incentives for capital repatriation.<sup>2</sup> This mechanism can be set in motion only when two conditions pertain: domestic agents have sufficient foreign assets, and foreign assets and foreign liabilities move, over a meaningful interval of time, in the same direction (e.g., declining liabilities lead to, or are accompanied by, declining assets).<sup>3</sup> This will particularly be the case with institutional investors with high contingent liabilities in domestic currency.

This mechanism is possible if agents in the recipient economy possess international assets and these tend to move in a compensating direction (e.g., when foreign liabilities decline, so do foreign assets). This means that, at the end of the day, a necessary condition for the depletion of foreign assets by domestic agents to counteract an ISS is the existence of a sufficiently developed domestic financial sector that can sustain foreign investment by large financial intermediaries. If this is the case, it could reflect repatriations of assets by domestic institutional investors such as pension funds and insurance companies, which have contingent liabilities in domestic currency, but which have diversified their portfolios by investing abroad. Individual investors may tend to act in a similar fashion. In the absence of stock and bond markets of a significant size and of large institutional investors, ISS are likely to result in FASS. In this context, there is a significant difference between advanced economies and emerging and developing economies. The former economies exhibit a high correlation between changes in international liabilities and changes in international assets, while in the latter this correlation is generally much lower.

While resembling other recent work, our study has two novel characteristics. While most existing studies identify only two events (experiencing or not experiencing a sudden stop in the financial account; see [Calderon and Kubota, 2013](#); [Calvo, 1998](#); [Calvo and Reinhart, 2000](#); [Calvo et al., 2004](#); [Edwards, 2004 and 2007](#); [Cavallo and Frankel, 2008](#)), our paper attempts to go farther, by identifying three types of events: experiencing neither an ISS nor a FASS; experiencing an ISS, but not a FASS; and experiencing simultaneously an ISS and a FASS. Moreover, the second innovation is that we estimate a multinomial logit

<sup>1</sup> Countries with a fixed exchange rate regime will also experience falling domestic asset prices as domestic demand falls. The real exchange rate may be less prone to depreciate in the short run, since domestic prices are sticky. Nonetheless, real activity will decline together with the contraction in aggregate demand.

<sup>2</sup> The causality between foreign liability declines and foreign asset depletion is difficult to test. However, if ISS leads and foreign asset depletion follows, one would expect the sequence to involve falling foreign liabilities, leading to currency depreciation and domestic asset price declines, which encourage domestic agents with assets abroad to repatriate capital. Such repatriations would be followed in turn by some reversal in the original currency depreciation and asset price declines.

<sup>3</sup> If domestic wealth holders behave the same way as foreign investors, the ability of domestic investors to invest abroad would exacerbate ISS rather than moderate them. If, on the other hand, the horizons and objectives of domestic investors are centered on the domestic economy, then the hypothesized effects of holding assets abroad would hold. Think of a pension fund in an emerging economy that has to accumulate assets to pay pensions in the domestic currency. Its objectives and horizons are quite different from those of a foreign investor in the country's stock market: pensions are paid in domestic currency; moreover, if the pension fund managers have reasonable expectations and domestic asset price and the domestic currency have experienced significant overreaction ([De Bondt and Thaler, 1988](#)), they will expect an eventual bounce back in domestic financial asset prices and in the domestic currency.

(with the three events described in the preceding paragraph as endogenous variables), incorporating to the list of explanatory variables a new variable that we have not seen in previous studies: the historical correlation between the annual variation in international assets and liabilities of a country's residents.

Our study intends to be an addition to what we know from recent contributions to the analysis of sudden stops in the financial account. [Rothenberg and Warnock \(2011\)](#) differentiate between types of sudden stops. They argue that a sudden stop in the financial account can be due to a sudden stop or a reversal in foreign capital inflows by foreign investors. This is what they call a true sudden stop. However, a FASS can also be the consequence of a sudden and significant outflow of capital by residents (sudden flight or sudden start). These authors find that almost one half of FASS are really sudden starts and that true sudden stops are much more damaging in terms of lost output and cause larger depreciations in the real exchange rate.<sup>4</sup> Our study differs from Rothenberg and Warnock's in that we focus attention on the abrupt and significant interruption of foreign capital inflows (ISS) and ask the question of why some of these events are counteracted by the behavior of foreign assets owned by residents and why others are not. While the former events do not wind up as FASS, the latter do.

[Forbes and Warnock \(2012\)](#) also distinguish between changes in foreign liabilities and foreign assets. They find that, generally, sudden stops in foreign liabilities (what we call ISS) tend to be correlated with compensating capital repatriations by domestic asset owners. The coefficient they find, while significant, is much lower than the ones we report for developed countries and higher than the one we estimate for emerging economies, perhaps because they do not differentiate between them. At the same time, gross capital inflow surges by foreigners are also correlated with domestic capital outflows. The econometric analysis they perform suggests that the major cause behind capital flow changes is perceived international risk and that domestic factors play a much less key role. This finding is very similar to that of [Agosin and Huaita \(2012\)](#).

Two other studies ([Cowan, De Gregorio, Micco, and Neilson, 2007 and 2008](#)) are closer in spirit to ours. They also differentiate between sudden stops that are caused by the behavior of foreign investors (inflows) and those that are the consequence of the saving and investment decisions of a country's residents (outflows). In this study, the authors also show that, in emerging economies, the former are the most damaging in terms of production and investment. They also conclude that inflow sudden stops are as likely to occur in emerging as in developed economies, arguing that the difference between these two groups of countries lies in the behavior of outflows. Finally, with the use of linear regressions, these authors show that the covariance between inflows and outflows is larger the higher is a country's income level and the greater are its stocks of foreign assets.

The paper is organized as follows. [Section 2](#) describes the data used and the stylized facts that can be coaxed from them. [Section 3](#) identifies the episodes that constitute the centerpiece of the study: ISS that do not wind up being FASS; and ISS that effectively end up being FASS. [Section 4](#) carries out a multinomial logit exercise to test the paper's hypotheses. Finally, [Section 5](#) concludes.

## 2. Data and some stylized facts

This study uses data for 59 countries, of which 22 are developed economies. The frequency of the information is annual and covers from 1976 through 2010. We define inflows as the net change in international liabilities of residents (inflows into country  $i$  in period  $t$  are denoted by  $I_{it}$ ). Note that this variable can be positive or negative. If it is positive, it means that, in net terms, the international debt of residents, plus the net level of FDI stocks owned by foreign companies, plus the stock of shares in domestic firms owned by foreigners in the country have risen; while a negative value implies a decline in the levels of the stock of debt owed to foreigners plus equity owned by foreigners.

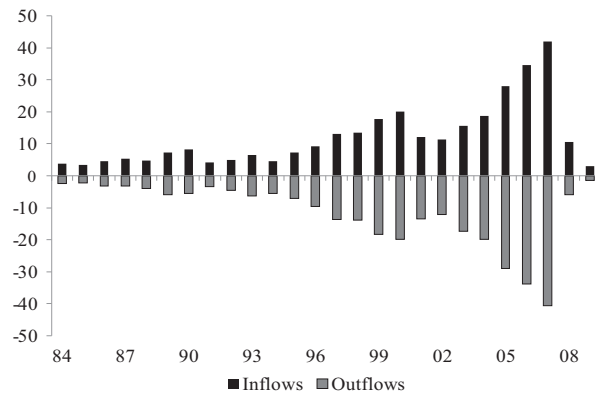
On the other hand, outflows correspond to changes in the assets of residents abroad. These assets can take the form of FDI by domestic firms, foreign stocks or bonds held by residents, or debt of foreigners to residents. They can also be positive or negative. If net international assets increase, outflows are positive; if they decline, they are negative. The outflows from country  $i$  in period  $t$  are denominated  $O_{it}$ . Combining inflows and outflows, we obtain country  $i$ 's financial account in period  $t$ :  $FA_{it} = I_{it} - O_{it}$ .

We use data from International Financial Statistics (IFS) of the International Monetary Fund and World Development Indicators (WDI) of the World Bank. Most of the variables we use are scaled to GDP, constructing the latter as a quadratic trend of actual GDP. The complete list of countries, as well as the details on the specific source of the data are available on request.

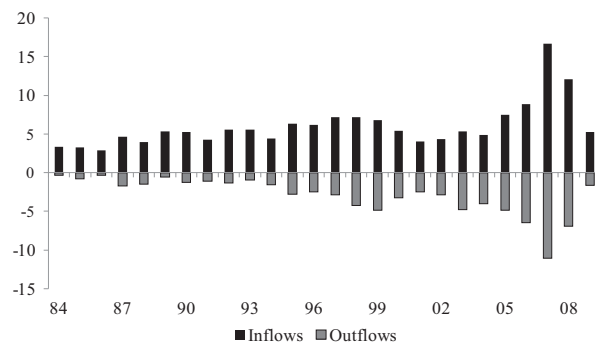
When one looks at a graphic presentation of the changes in international assets and liabilities, the first thing that draws one's attention is the clear difference that exists between advanced and other economies as regards the evolution of outflows. In [Fig. 1](#), for advanced economies the behavior of outflows looks like a mirror image of inflows (symmetry), while for other economies ([Fig. 2](#)) there is no such mirror image. In the latter, the behavior of outflows is more asymmetric, especially in the 1980s and 1990s.

Moreover, as shown in [Table 1](#), if one compares the volatility of the annual change in inflows as between these two kinds of countries, one finds that such volatility is not greater for emerging and developing countries than that for advanced countries, which is in line with one of the findings of [Cowan et al. \(2007\)](#).

<sup>4</sup> [Cavallo et al. \(2015\)](#) reach a similar conclusion and further provide a much more specific taxonomy of sudden stops to identify which ones are more disruptive.



**Fig. 1.** Average of inflows and outflows (as % of GDP) in advanced economies (Outflows are shown with negative sign). Source: Authors' calculations based on IMF's data.



**Fig. 2.** Average of inflows and outflows (as % of GDP) in emerging economies (Outflows are shown with negative sign). Source: Authors' calculations based on IMF data.

**Table 1**

Average and median of the standard deviation of  $\Delta FA_t$  and  $\Delta I_t$  per type of economy.

	$\sigma_{\Delta FA}$		$\sigma_{\Delta I}$	
	Mean	Median	Mean	Median
Advanced economies (22)	3.58	3.14	10.49	5.99
Non-advanced economies (37)	5.45	4.94	7.04	5.53

Source: Authors' calculations based on IMF data.

Where one does find a significant difference between these two groups of countries is regarding the annual changes in the financial account. This reinforces the idea that the key difference lies in the behavior of international assets owned by residents. [Broner and Rigobón \(2006\)](#) have already noted the greater volatility in the financial account of emerging economies, as compared to that of developed countries.

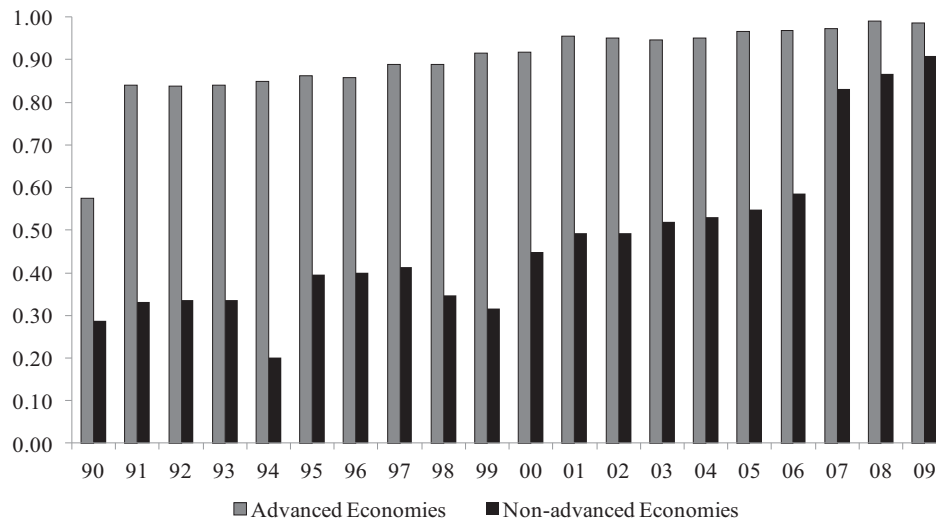
Finally, when analyzing the correlation coefficient between the annual change in international assets and liabilities,<sup>5</sup> one can verify that it has been much higher in advanced rather than other economies. It should also be noted that this correlation rose during the decade of the 2000s for the non-advanced economies ([Figs. 3 and 4](#)).

### 3. Identifying booms and sudden stops

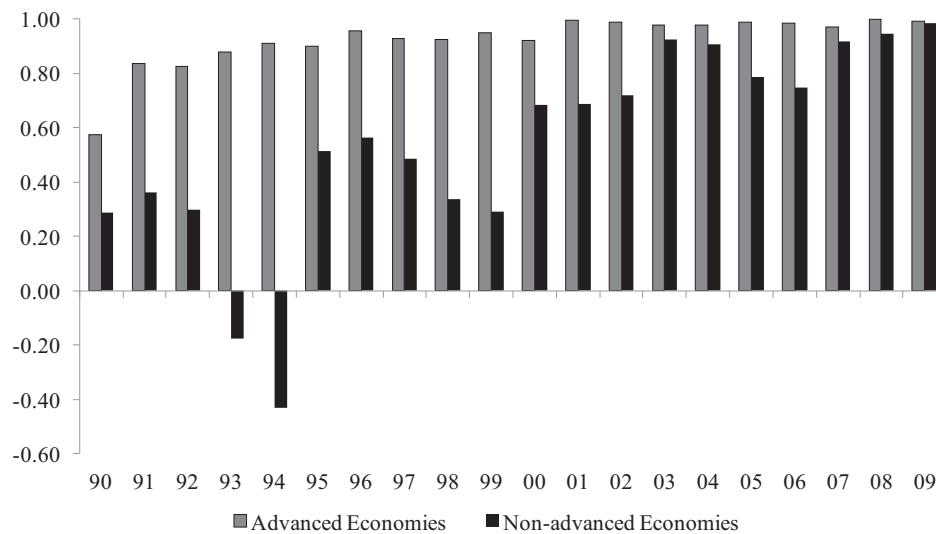
#### 3.1. Boom episodes

Following [Agosin and Huaita \(2012\)](#), we define a capital boom in the financial account of country  $i$  period  $t$  if the following condition can be verified:

<sup>5</sup> Calculated with moving windows of five years, as well as with windows with a fixed initial year.



**Fig. 3.** Correlation coefficient between the average of  $\Delta I_t$  and  $\Delta O_t$  (as a % of GDP) using a recursive window. Source: Authors' calculations based on IMF data.



**Fig. 4.** Correlation coefficient between the average of  $\Delta I_t$  and  $\Delta O_t$  (as a % of GDP) using rolling windows of 5 years. Source: Authors' calculations based on IMF data.

$$B_{it}^{FA} = \begin{cases} 1 & \text{if } FA_{it} > \overline{FA}_i + \sigma_{FA_i} \text{ and } \frac{FA_{it}}{GDP_{it}} > 5\%, \\ 0 & \text{otherwise,} \end{cases}$$

where  $FA_{it}$  is the value of the financial account of country  $i$  in period  $t$ ,  $\overline{FA}_i$  is its mean and  $\sigma_{FA_i}$  is its standard deviation in the sample period. Applying this rule, we identify 177 financial-account boom episodes (12 percent of the observations in the sample) in the period 1976–2010, where 42 took place in advanced economies and 135 in non-advanced economies. The detailed list of episodes is available upon request. In the same fashion, we can identify the inflow boom episodes for country  $i$  in year  $t$ , if the following pertains:

$$B_{it}^I = \begin{cases} 1 & \text{if } I_{it} > \bar{I}_i + \sigma_{I_i} \text{ and } \frac{I_{it}}{GDP_{it}} > 5\%, \\ 0 & \text{otherwise,} \end{cases}$$

where  $I_{it}$  is the inflows (increases in foreign liabilities) of country  $i$  in year  $t$ ,  $\bar{I}_i$  is its mean in the sample period and  $\sigma_{I_i}$  its standard deviation. With this criterion, as shown in Table 2, we find 206 inflow boom episodes (13 percent of the total number of observations), of which 68 took place in advanced economies and 138 in non-advanced economies. Of the 206 inflow boom episodes, 101 ended up as financial account booms, while in the other 105 episodes there was a compensation coming

**Table 2**

Number of episodes of boom in *I* and *FA* and coincidences per type of economy (22 advanced and 37 non-advanced countries).

Type of event	Number of episodes		
	Total	Advanced economies	Emerging economies
Boom of inflows	206	68	138
Boom of financial account	177	42	135
Coincidences	101	11	90

Source: Authors' calculations based on IMF data.

from a contraction in outflows (declines in assets held abroad by residents). Most of the booms in inflows that became a boom in the financial account (about 90%) took place in non-advanced economies.

### 3.2. Sudden stop episodes

In order to identify a sudden stop in the financial account (FASS), we follow [Guidotti et al. \(2004\)](#) and [Agosin and Huaita \(2012\)](#), who define an FASS as a year in which the annual decline in the financial account is at least one standard deviation larger than its average and, at the same time, this decline is at larger than 5 percent of GDP. In other words, the following conditions must obtain:

$$FASS_{it} = \begin{cases} 1 & \text{if } \Delta FA_{it} < \overline{\Delta FA}_i - \sigma_{\Delta FA_i} \text{ and } \frac{\Delta FA_{it}}{GDP_{it}} < -5\%, \\ 0 & \text{otherwise,} \end{cases}$$

where  $\Delta FA_{it} = FA_{it} - FA_{it-1}$  is the annual change in the financial account. We found 96 FASS episodes in 1976–2010 (6.5 percent of the sample). Using the same metric, we attempted to find the years in which an ISS had taken place:

$$ISS_{it} = \begin{cases} 1 & \text{if } \Delta I_{it} < \overline{\Delta I}_i - \sigma_{\Delta I_i} \text{ and } \frac{\Delta I_{it}}{GDP_{it}} < -5\%, \\ 0 & \text{otherwise,} \end{cases}$$

where  $\Delta I_{it} = I_{it} - I_{it-1}$  (the annual variation in inflows). We found 121 episodes of ISS, corresponding to 8.2 percent of the sample ([Table 3](#)). [Table 3](#) shows that more than 80 percent of the coincidences between episodes of ISS and FASS took place in non-advanced economies. On average, we find that both advanced economy and non-advanced economies experienced approximately two episodes of ISS during the period considered. However, the numbers are quite different when we examine the ISS that coincided with FASS (row of “coincidences” in [Table 3](#)). In effect, the average advanced economy suffered only 0.5 episodes of this nature during the period. By contrast, the average non-advanced economy (emerging or developing) suffered almost one full episode of sudden stops in inflows and financial account during the period.

## 4. Econometric analysis

In this section, we carry out a simple econometric analysis that allows us to determine which variables are important in preventing an ISS from becoming a FASS. Specifically, we define a discrete variable that takes three values:

$$D_{it} = \begin{cases} 0 & \text{if } ISS_{it} = 0, \\ 1 & \text{if } ISS_{it} = 1 \text{ and } FASS_{it} = 0, \\ 2 & \text{if } ISS_{it} = 1 \text{ and } FASS_{it} = 1. \end{cases}$$

This variable allows us to differentiate between an ISS that does not become a FASS ( $D_{it} = 1$ ) from an ISS that does end up as a FASS ( $D_{it} = 2$ ). Clearly, the difference between  $D_{it} = 1$  and  $D_{it} = 2$  is determined by the behavior of outflows. We consider that the base scenario is that there is no ISS ( $D_{it} = 0$ ). This is the endogenous variable in all the models and what distinguishes this study from others that have preceded it. We estimate a multinomial logit. Specifically, the probabilities of the three states that the endogenous variable can take are given by the following expressions:

$$Pr(D_{it} = 0) = \frac{1}{1 + \sum_{j=1}^2 \exp(X'_{it}\beta_j)}, \quad Pr(D_{it} = k) = \frac{\exp(X'_{it}\beta_k)}{1 + \sum_{j=1}^2 \exp(X'_{it}\beta_j)}, \quad k = 1, 2.$$

Here,  $X_{it}$  is a vector of explanatory variables (detailed below), and  $\beta_j$  ( $j = 1, 2$ ) is a vector of parameters. Note that each value taken by the endogenous variable is associated with a parameter vector (except for the base case of  $D_{it} = 0$ , where the parameters are set to zero). With the probabilities so defined, we construct the likelihood function, and the estimation is carried out by maximum likelihood. Vector  $X_{it}$  includes a series of economic variables which one might a priori think affect the probability of experiencing an ISS without at the same time suffering a FASS. It also includes variables that one might expect would cause both an ISS and a FASS. More precisely, the following variables are included: having experienced an



**Table 3**

Number of episodes of sudden stop in  $I$  and  $FA$  and coincidences per type of economy (22 advanced and 37 non-advanced countries).

Type of event	Number of episodes		
	Total	Advanced economies	Emerging economies
Sudden stops in inflows	121	43	78
Sudden stops in financial account	96	22	74
Coincidences	49	9	40

Source: Authors' calculations based on IMF data.

inflow boom the year before<sup>6</sup>; changes in the terms of trade (annual percentage change, lagged one period); lagged fiscal deficit as a percentage of GDP; a dummy variable equal to one for advanced economies; the lagged level of international assets and liabilities (as a share of GDP); and the lagged change in international assets and liabilities (as a percentage of GDP). Most of these variables are entered as potential explanatory variables in previous studies that attempt to study the determinants of FASS.

Additionally, in this study we add a novel explanatory variable that we have not seen in previous studies. This is the correlation between  $I_{it}$  and  $O_{it}$  (correlation between changes in international assets and liabilities) over the past five years, specifically, the correlation coefficient between  $\{I_{it-1}, I_{it-2}, \dots, I_{it-5}\}$  and  $\{O_{it-1}, O_{it-2}, \dots, O_{it-5}\}$ .<sup>7</sup> One could argue that this correlation would not affect the probability that a country underwent a sudden stop only in inflows, since this event would be explained to a larger extent by other factors (having experienced a preceding boom in inflows, terms-of-trade changes, among others); however, it should affect the probability of a sudden stop in inflows not winding up being a sudden stop in the financial account as a whole. In other words, if this variable is statistically significant, a country's international financial assets would be playing a key role in counteracting the abrupt exit of capital during an inflow sudden stop (falls in the changes in international liabilities)<sup>8</sup> and in preventing the financial account from deteriorating.<sup>9</sup>

Before presenting the results, a technical comment is in order. There have not been methodological advances allowing the estimation of a fixed effects panel with a discrete endogenous variable. More precisely, note that in a panel one incorporates fixed effects for countries or time periods, but estimating each one of these fixed effects is infeasible: asymptotically, when the number of countries increases and tends to infinity, we would have to estimate an infinite number of parameters. On the other hand, omitting them yields inconsistency in the remainder of the parameters one is estimating. Therefore, when the functional form to be estimated is linear in the parameters, one employs the variables after correcting by their time-period averages (or their lags), which leads to the disappearance of the fixed effect in the estimation (its average is the fixed effect of each country), generating consistent estimates for the remaining parameters. This correction, however, cannot be used when the functional form to be estimated is non-linear. As a result, the up-to-date advances in the study of a multinomial logit with panel data and fixed effects do not allow us to use a better procedure. For this reason, the results we show below are those that emerge from the estimation of a pooled multinomial logit (omitting fixed effects).

In Table 4 we present the results of the estimations. We report the marginal effects of each variable on the probabilities of the events, i.e., how much does the probability of an event increase when an exogenous variable increase in one unit. We highlight three results. Firstly, a country that experiences an inflow boom in year  $t - 1$  is highly likely to experience a sudden stop in inflows in year  $t$  (which may or may not end up as a sudden stop in the financial account). This result is in line with those of Agosin and Huaita (2012), who find that a boom in the net inflows (the financial account) is the variable that most strongly explains later sudden stops. Note that the difference in our findings from those of Agosin and Huaita (2012) is that ours relate to gross inflows (increases in foreign liabilities). Sula (2010) also finds that surges in capital inflows precede sudden stops, especially when accompanied by a high current account deficit or an appreciated real exchange rate.

Secondly, as we earlier sensed from the descriptive analysis on boom and sudden stop episodes, the advanced economy dummy is not statistically significant, and therefore, being an advanced economy does not have any effect on the probability of undergoing an ISS. In other words, all countries, developed or not, have just about the same probability of experiencing an ISS. On the other hand, being an advanced economy will play a key role when analyzing the behavior of international assets held abroad, as they may offset any abrupt stop of external funding when being repatriated. Most advanced economies have both large foreign assets abroad and large international liabilities.

Lastly, the historical correlation between the change in inflows and outflows also plays a fundamental role in explaining the probability of turning an ISS into a FASS. When this correlation is higher, the chance of finding an ISS turning into a FASS drops significantly. The mechanism is straightforward: when international assets and liabilities vary in a similar fashion, a

<sup>6</sup> Note that Agosin and Huaita (2012) find that previous booms in the financial account are the most significant variables explaining FASS in non-advanced economies.

<sup>7</sup> There is obviously an element of arbitrariness in defining the length of the window use to estimate the correlation coefficient (five years in our case). We did carry out a sensitivity exercise with a window of seven years, but the results are practically the same.

<sup>8</sup> When the sudden stop in inflows is acute, the level of international liabilities could shrink.

<sup>9</sup> Conventionally, a sudden stop is defined as the second derivative with respect to time of the relevant stock variable – either the net international financial position (with a negative sign), when referring to the financial account, or international liabilities, when the concept is applied to inflows.

**Table 4**  
Estimated Pooled Multinomial Logit.

Explanatory variables	Marginal effects							
	(1)		(2)		(3)		(4)	
	Pr(D = 1)	Pr(D = 2)	Pr(D = 1)	Pr(D = 2)	Pr(D = 1)	Pr(D = 2)	Pr(D = 1)	Pr(D = 2)
A. Boom in inflows (dummy variable, 1 = boom, 0 = otherwise, lagged)	0.133 (0.028)***	0.107 (0.026)***	0.139 (0.029)***	0.090 (0.024)***	0.130 (0.029)***	0.082 (0.025)***	0.133 (0.031)***	0.074 (0.025)***
B. International Assets (as % of GDP, lagged)	0.000 (0.000)***	-0.001 (0.000)***	0.000 (0.000)***	0.000 (0.000)	0.000 (0.000)***	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
C. Type of economy (dummy variable, 1 = advanced, 0 = otherwise)	-	-	0.010 (0.009)	-0.018 (0.008)***	-	-	-	-
D. Correlation between inflows and outflows (rolling window of 5 years, lagged)	-	-	-	-	0.033 (0.012)***	-0.016 (0.009)*	0.032 (0.014)**	-0.021 (0.009)**
E. Term of trade (annual growth)	-	-	-	-	-	-	-	-
F. Fiscal deficit (as % of GDP, lagged)	-	-	-	-	-	-	0.000 (0.001)	0.000 (0.001)
G. Change in International Assets (annual change, as % of GDP, lagged)	-	-	-	-	-	-	-	-
Pseudo R2	0.12		0.13		0.12		0.12	
Explanatory variables	Marginal effects							
	(5)		(6)		(7)			
	Pr(D=1)	Pr(D=2)	Pr(D=1)	Pr(D=2)	Pr(D=1)	Pr(D=2)		
A. Boom in inflows (dummy variable, 1 = boom, 0 = otherwise, lagged)	0.153 (0.049)***	0.034 (0.026)	0.16 (0.052)***	0.033 (0.026)	0.163 (0.053)***	0.032 (0.025)		
B. International Assets (as % of GDP, lagged)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)		
C. Type of economy (dummy variable, 1 = advanced, 0 = otherwise)	-	-	-	-	-	-		
D. Correlation between inflows and outflows (rolling window of 5 years, lagged)	0.034 (0.021)	-0.015 (0.009)*	0.03 (0.027)	-0.021 (0.009)**	0.029 (0.026)	-0.021 (0.009)**		
E. Term of trade (annual growth)	0.002 (0.001)**	0.000 (0.000)	0.003 (0.001)*	0.000 (0.000)	0.003 (0.001)**	0.000 (0.000)		
F. Fiscal deficit (as % of GDP, lagged)	-	-	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)		
G. Change in International Assets (annual change, as % of GDP, lagged)	-	-	-	-	0.000 (0.000)	0.000 (0.000)***		
Pseudo R2	0.17		0.16		0.181			

Standard errors in parentheses.

\*\*\* p-value < 0.01.

\*\* p-value < 0.05.

\* p-value < 0.1.

sudden reduction of foreign assets in the domestic economy is counteracted by a return of domestic assets that had been held abroad. As discussed earlier, this is more often the case in advanced economies, as they exhibit higher correlations between inflows and outflows variations than non-advanced economies.

When interpreting the result, one might think that when a country suffers an unexpected flight of foreign capital, among other consequences, a real exchange rate depreciation is to be expected, along with a decline in the prices of domestic financial assets. Here, the behavioral finance literature may be of indirect assistance: both the exchange rate and domestic asset prices may fall more than what might be explained by long-term fundamentals of the recipient country, as panics may lead to bandwagon effects (De Bondt and Thaler, 1988, explain the overshooting of stock prices in these terms). Eventually, asset prices may come to be viewed as beaten down enough by agents holding assets abroad (be they public or private). This may be especially true of pension funds or domestic insurance companies, which have long-term liabilities in domestic currency. We also speculate that countries with a high correlation between changes in inflows and outflows are characterized by relatively deep domestic financial markets. Using several indicators of the latter, we find corroborating evidence of this hypothesis (results on request).

## 5. Concluding remarks

We have studied the determinants of sudden stops in capital flows, differentiating situations in which sudden stops in inflows do not translate into sudden stops in the financial account from those in which they do. Our findings were based on estimating a multinomial logit that allows us to evaluate the effects of these determinants on the probabilities of facing distinct types of sudden stop scenarios.



We find that developed countries have about the same chances of experiencing sudden stops in inflows when compared to developing economies. Nevertheless, the latter face financial account sudden stops much more often than the former. This result is consistent with what has been found in recent literature. A second result that matches earlier findings is that booms in inflows precede future sudden stops in inflows. However, the increase in the odds of a sudden stop after a boom is higher for inflow sudden stops than for financial account sudden stops.

A novel conclusion from our exercise is that the correlation between inflows and outflows is a good predictor of future sudden stop events in the financial account. Indeed, a higher correlation is consistently associated with a lower probability of experiencing a financial account sudden stop. The correlation between capital inflows and outflows may be affected by policy decisions. For instance, some countries try to lock in institutional investors by limiting foreign investments. While limiting outflows, this may inhibit the stabilizing impact of repatriation during times of sudden stops in inflows. Sovereign wealth funds in countries with abundant natural resources also have a role to play in protecting the domestic economy from inflow sudden stops. When natural resource prices and exports are high, it is a good policy to save a sizable proportion of the increase in rents into a sovereign wealth fund, which later can be used not only when prices decline but also when foreigners' capital dries up.

As a last policy comment, note that reserve accumulations by central banks may play a similar role in moderating inflow sudden stops. Indeed, when a central bank identifies an inflow sudden stop, it may use its reserves to counteract it. This is even the case of countries utilizing flexible exchange rates. Sudden stops are by nature transitory phenomena (which, avowedly, may take a long time to dissipate). And the reason for accumulating reserves is precisely to smooth the consequence of short-term shocks.

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