Preventing Sudden Stops in Net Capital Flows*

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Abstract

Sudden stops in net capital flows can be prevented if domestic investors either repatriate foreign-held assets or roll over their local asset holdings when foreign investors stop lending or sell off their local asset holdings. This paper presents evidence showing that domestic factors such as low levels of liability dollarization, the consistency of the monetary and exchange rate regimes, low inflation, higher growth, and a solid institutional background, explain why some countries are more successful in eliciting the behaviors that increase the probability of preventing a sudden stop following a tightening of the external borrowing constraint. Prevention is key to offsetting an external credit crunch originating in factors that are usually outside the control of borrowing countries, which can turn into costly sudden stops in net capital flows in the affected economies.

JEL Codes: F30; F32; F40

Keywords: Gross capital flows, Sudden stops, Retrenchments, Domestic versus foreign investors

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1 Introduction

The genesis of "sudden stops" in capital flows is an abrupt and unexpected cut-off in international credit, i.e., a sudden stop in *gross inflows*. When foreign investors stop lending, debtor countries must adjust to a tighter external financing constraint. Yet not everyone in a country that is on net borrowing from abroad is a debtor vis-à-vis the rest of the world. In open economies, a portion of national savings goes to purchasing foreign assets via *gross outflows*. Those foreign-held assets by resident investors can eventually be repatriated, relaxing the external financing constraint. If that repatriation happens when foreigners stop lending, then a sudden stop in net capital flows may be prevented.

The notion of "prevention" in this paper takes a specific meaning. It is not about removing the risk that foreign lenders may abruptly stop lending. That is usually outside the control of any given country. It refers to conditions under which a sudden stop in gross inflows (henceforth "foreigners' sudden stop") does not become a full-fledged sudden stop in net flows. A "prevented sudden stop" is thus a situation in which gross outflows move in the opposite direction to gross inflows so that net capital flows (i.e., gross inflows *minus* outflows) remain relatively stable, meaning that net capital flows do not enter into sudden stop mode.

Several papers have documented a high negative correlation between gross inflows and gross outflows in the balance of payments in the course of normal business cycle fluctuations.[1] In fact, inflows and outflows increase during economic expansions and decrease during recessions, generating a degree of automatic offsetting between the two types of flows. Borio and Disyatat (2011) suggest that the automatic offsetting occurs because a large portion of the recorded capital flows are simply the accounting entries in the balance of payment statistics of the exchange of financial claims between residents and foreigners, which do not impact net flows.[2] However, that negative correlation between the flows does not imply that prevention is the norm when the external borrowing constraint binds. In fact, during the global financial crisis of 2008/09, significant retrenchments of resident investors compensated for the fall in gross inflows from foreign investors in many countries, but not everywhere. In addition, before and after the global financial crisis there were episodes of excessive volatility in net capital flows as documented and analyzed in the

[1] See Broner et al. (2013); Davis and Van Wincoop (2018); IMF (2013); Milesi-Ferretti and Tille (2011).

[2] In the example of Borio and Disyatat (2011), if a US resident decides to buy Japanese bonds, this transaction implies a gross outflow from the United States to be paid either: i) using the resident's existing stock of yen (i.e., thus reducing gross outflows from the United States by the same amount) or ii) by the resident selling dollars to a foreign bank in exchange for yen (which would result in an offsetting increase in gross inflows to the United States). In both cases, there is an automatic offsetting and no change in net flows.

extensive sudden stops literature.[3]

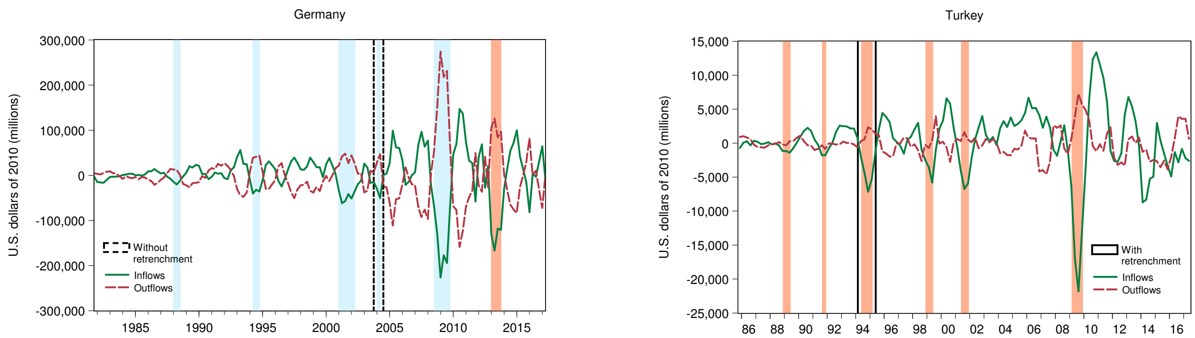
The concept of prevention can be further understood through reference to the data of two countries with orthogonal outcomes in terms of the incidence of different types of episodes. Figure 1 displays the dynamics of the gross inflows (solid green line) and outflows (dashed red line) of Germany and Turkey. When the solid line falls below a given threshold (not shown), we assume that the external borrowing constraint binds such that a foreigners' sudden stop materializes. The blue-shaded (light-shaded) areas identify the foreigners' sudden stops episodes that were also "prevented sudden stops." They are all in Germany. The red-shaded (dark-shaded) areas identify the episodes of foreigners' sudden stops that were not prevented. They are all the episodes in Turkey, and one of the episodes in Germany. In the case of Germany, changes in gross flows exhibit a "diamond pattern" all the time. This implies that periods in which inflows declined almost always coincide with periods in which outflows move in the opposite direction (and in similar magnitudes). These offsetting variations have allowed the country to prevent all the sudden stops in net flows, except for one episode in 2013. In Turkey, there is also a negative correlation between gross inflows and outflows, but the dynamics of capital flows are different when the external borrowing constraint binds. None of the foreigners' sudden stops identified over the last 20 years in Turkey turned into prevented sudden stops in net flows. This was so because the offsetting variations in outflows were not large enough to compensate for the fall in inflows.

Using a larger set of episodes from advanced and emerging economies, this paper explores the conditions under which prevention is more likely to happen when the external borrowing constraint binds. We start with a stylized global games model in which there is a "knowledge mechanism" such that domestic investors are better informed about their own economy. Prevented sudden stops in the model are the result of two transitions: first, the transition from normal to crisis periods that is triggered when foreigners stop lending (i.e., when gross inflows decline), and second, the transition to a prevented sudden stop that is triggered when resident investors roll over their local investments and repatriate foreign-held assets to offset the reduction in inflows from foreigners. In the model, prevention is not automatic, even when domestic investors have profitable opportunities to tap; instead, prevention is ultimately determined by the state of domestic economic fundamentals.

We test the model implications through an empirical framework that considers the idiosyncratic roles of domestic and of external investors. The objective is to find the empirical determinants of

[3] The starting point of much of the sudden stop literature can be traced back to the analytical model of Calvo (1998). Cavallo (2019) provides a survey of the literature.

Figure 1: Inflows, Outflows, and Prevented Sudden Stops



Source. Authors' calculations based on data from IMF-BOPS. Blue-shaded (lighter) areas correspond to episodes catalogued as "prevented sudden stops." Red-shaded (darker) areas correspond to foreigners' sudden stop episodes that were not prevented. The graph also shows which of those episodes coincide with a retrenchment episode (or not).

prevention during periods of tight external borrowing conditions. We confirm results reported in Forbes and Warnock (2012) showing that external factors - i.e., conditions that are outside the direct control of local policymakers - predominate in explaining the incidence of foreigners' sudden stops. We additionally provide new results showing that domestic factors explain why some of the foreigners' driven episodes do not turn into sudden stops in net capital flows. Notice that our object of analysis is different from that of the "retrenchment" literature. This literature looks into determinants of large variations in gross outflows that may or may not coincide with periods of collapses in gross inflows, and when they do, in many cases they do not even have the required magnitude to prevent a sudden stop. Moreover, it turns out that the determinants of sudden stop prevention are different from those of retrenchments.

We show that the ability to prevent sudden stops in net flows during an international credit crunch relies primarily on the strength of domestic fundamentals. We find that prevented sudden stops are between 53 and 43 percent more likely in countries that are at the 25th percentile of the global distributions of liability dollarization, and the rate of annual inflation, respectively, than in countries that are at the 75th percentile of those distributions. Moreover, in countries with consistent monetary frameworks (defined as inflation targeting with flexible exchange rates) the implied probability of prevention is 57 percent, compared to close to zero for countries where the monetary and exchange rate frameworks are inconsistent.

Why should countries care about preventing sudden stops? A sudden stop in net capital flows imposes an adjustment in the outstanding current account deficit of the affected economy. This adjustment typically entails large and long-lasting output loss. On the contrary, if the sudden stop can be prevented, then the ensuing adjustment of the current account deficit is forgone and, therefore, the associated output losses are lower.[4] We present new results using the Jordà (2005) local projection method, showing that when sudden stops are prevented, the cumulative output loss four years after the onset of the foreigners' sudden stop is 2 percent of GDP smaller, on average, than when the sudden stop in net capital flows materializes. [5]

Related Literature. The theoretical underpinning of this paper is closely related to Caballero and Simsek (2016) and Jeanne and Sandri (2017). Those papers present frameworks where local investors provide a stabilizing counter-force to the "fickleness" of foreigner investors. In the two models, liquidity shocks trigger "fire sales" of local assets held by foreigners. The posterior decision of domestic investors to capitalize on those fire-sales is independent of the conditions in the domestic economy because there is no uncertainty about the final return of those assets. This paper introduces uncertainty into the return of domestic assets. We find that with uncertain returns, the offsetting behavior from domestic investors is not mechanical; it is instead contingent on the state of the underlying domestic fundamentals.

Empirically, this paper belongs to a strand of the sudden stops literature that considers the distinct roles of gross capital inflows and outflows in the dynamics of net capital flows. Until the 1990s, the relative size of gross outflows vis-à-vis gross inflows was negligible in emerging markets. Thus, discussions about sudden stops - a phenomenon that was then prevalent in emerging markets - focused exclusively on "net flows," which were almost a synonym of "gross inflows." Since the global financial crisis of 2008/09, the scope of analysis has broadened. As local investors started playing more sizable roles in emerging markets, the discussion shifted towards differentiating foreigners (i.e., gross inflows) from resident investors (i.e., gross outflows); see Cavallo (2019). This distinction makes it possible to analyze sudden stops from different perspectives. On the one hand, sudden stops in net capital flows can be the consequence of a decline in inflows from foreigners; on the other hand, they can be driven by an increase in outflows from domestic agents (or "capital flight"). Moreover, the two types of investors can interact offsetting each other's actions, leading

[4]The literature has identified a rank order of varieties of sudden stops in gross and net flows, in terms of the output losses imposed on the affected economies. Sudden stops in net capital flows are the costliest. See Cavallo et al. (2015) for further analysis on this point.

[5]This is equivalent to about one - half of the estimated output losses from sudden stops in net capital flows that are not prevented.

to "prevented sudden stops," which is the focus of this paper.

Forbes and Warnock (2012) study the determinants of foreigners' sudden stops and retrenchments of capital outflows separately. They find that global factors such as global risk; changes in risk aversion, and global growth, are key drivers of both types of events. Our paper emphasizes the interactions between the events instead of analyzing them separately. More precisely, we define a different type of episode from the ones defined and analyzed by Forbes and Warnock (2012). The distinction matters because a retrenchment of capital outflows is neither a necessary nor a sufficient condition to prevent a sudden stop in net flows (See, for example, the cases of Germany and Turkey highlighted in Figure 1). Furthermore, the economic consequences of prevented sudden stops are different from either foreigners' sudden stops or retrenchments. This is so because prevented sudden stops, as we define them, originate in a crisis situation, i.e., in the context of a foreigners' sudden stop. Instead, a retrenchment in capital outflows - defined as a large repatriation of foreign-held assets- may encompass repatriations in times of economic strength. For example, a retrenchment can be the result of domestic investors' willingness to re-balance external portfolios in response to positive terms of trade shocks; or to recycle funds abroad following a surge in gross capital inflows.

In another related paper, Adler et al. (2014) analyze the role of resident investors in offsetting the behavior of foreign investors. Using vector autoregressions and impulse response functions, they find that local investors can neutralize the decline in inflows from foreign investors when facing global uncertainty and shocks to long-term interest rates. Our paper focuses on periods when the external borrowing constraint is already binding, i.e., when a foreigners' sudden stop has already materialized. This enables us to account for possibly different behaviors of resident investors during normal and crisis times. In addition, the methodology employed in this paper exploits cross-sectional and time series variation in capital flows as opposed to time series variation only. Another paper related to ours is Cifuentes and Jara (2014). They stress the role played by foreign assets holdings and exchange rate flexibility in shaping the probability that a retrenchment of capital outflows can occur when the economy is facing what in our paper we define as a foreigners' sudden stop. Our paper provides a theoretical framework to guide the empirical exercise, and it uses different empirical methods, a larger set of explanatory variables, and a broader sample of countries.

This paper is structured as follows. Section 2 introduces a model of prevented sudden stops. Section 3 focuses on the empirics of prevention, including a battery of sensitivity analyses of the results. Section 4 presents evidence on the benefits of preventing sudden stops is terms of reducing output losses. Finally, Section 5 provides concluding remarks.

2 A Model of Prevention

Environment. Consider an economy with two investors. There is a single "large" foreign investor (f-investor) and a continuum of "small" domestic investors (d-investors) as in Corsetti et al. (2004). Investors are risk neutral and derive utility u from consumption, which can be expressed in terms of their monetary wealth. The existence of a large foreign investor is a simplifying assumption to capture the potentially sizable effects on inflows of a foreigners' sudden stop.

Each type of investor holds an initial endowment of 2, which is split as follows: the f-investor holds $1-\beta$ in a domestic bond and $1+\beta$ in a safe foreign asset, and the d-investors hold $1+\beta$ in a domestic bond and $1-\beta$ in a safe foreign asset.[6] The parameter β determines the relative size of both types of investors in the economy, and the availability of funds abroad. The safe asset is denominated in foreign currency, while the domestic bond is denominated in local currency. The return on foreign assets is fixed and equal to r^f at maturity. The initial local/foreign exchange rate is fixed at $e = 1$, but it can be subject to devaluation depending on f-investor's decisions.

Investors' Problems. At an interim period, foreign and domestic investors can review their initial positions, and decide whether to withdraw (attack) or roll over (stay) their investments in the domestic economy. In case of withdrawal, investors can only recover a fraction $\kappa \in [0, 1)$ of their investment. The gross return at maturity of keeping their investment is $R(\theta, \ell)$. The return R is monotonically increasing in the fundamental θ, and decreasing in the proportion of agents ℓ who withdraw their investment. If the mass of withdrawals exceeds economic fundamentals ($\ell \geq \theta$) the economy becomes insolvent and the return on investment collapses to zero.

When domestic fundamentals are sufficiently strong, the economy is solvent. Thus, for any realization $\theta > 1$, all investors roll over their positions irrespective of the actions of the others. On the contrary, for any realization $\theta < 0$, there is a sudden stop in net flows as all investors withdraw their funds irrespective of the actions of others. For values of $\theta \in [0, 1)$ there is a coordination problem, in the spirit of global game models (Carlsson and van Damme, 1993; Morris and Shin, 1998), where optimal actions depend on the beliefs about the state θ and the actions of other investors.

[6] Goldstein and Pauzner (2004) consider a similar distribution to analyze contagion effects in the context of portfolio diversification and decreasing absolute risk aversion.

Information. We introduce incomplete information into the model. Investors do not observe the realization of θ, but they receive informative private signals about it. The large f-investor observes the realization of the following random variable:

$$y = \theta + \tau\eta \tag{1}$$

where $\tau > 0$ is a measure of how precise the signal for f-investor is and η is a standardized normal random variable. Small d-investors observe:

$$x_i = \theta + \sigma\epsilon_i \tag{2}$$

where $\sigma > 0$ is a measure of how precise the signal for d-investors is and the individual specific noise ϵ_i is distributed according to a normal standard distribution.

Assumption 1. *Domestic investors are relatively more informed about fundamentals of their own country than foreign investors, thus* $\frac{\sigma}{\tau} \to 0$

This assumption follows Nieuwerburgh and Veldkamp (2009). The authors state that it is optimal for investors to specialize in information others do not know. In this case, d-investors know better their economy and have a more accurate assessment of the true underlying fundamentals of their economy than the f-investor.[7]

Timing. The f-investor moves first.[8] Based on her signal, the f-investor decides whether to withdraw her domestic investment or roll it over . In case of withdrawal, the investor recovers a fraction $\kappa(1-\beta)$ of the initial investment, which is converted into foreign currency and invested in the safe asset with a return $1 + r^f$. Following Guimaraes and Morris (2007), we assume that starting from a withdrawal from the f-investor to maturity, the exchange rate depreciates to $\tilde{e} > 1$.[9] When the f-investor decides to roll over her investment, the return R is determined by the solvency condition and the exchange rate remains unaltered.

[7] The underlying factors behind this knowledge mechanism have been extensively discussed in Caballero and Simsek (2016).

[8] As stated in Corsetti et al. (2004), small investors have incentives to postpone their actions as they believe these are not capable of influencing the actions of the others, so there is no benefit in signalling.

[9] This assumption aims to capture that periods of distress are usually accompanied by a sharp currency depreciation that improve the return of investments in local currency that resident investors may want to tap (as opposed to foreign investors that usually care about the foreign currency return of their investments). This idea is consistent with the literature that links currency depreciation and investment incentives, such as the theoretical work in Froot and Stein (1991), Blonigen (1997), and the empirical work of Klein and Rosengren (1994) and Goldberg and Klein (1997).

After observing the action of the f-investor, d-investors decide whether to withdraw the domestic investments (i.e., capital flight) or roll over (i.e., stay). In case of capital flight, they recover $\frac{1}{\bar{e}}\kappa(1+\beta)$ from their domestic position and they invest it in the safe foreign asset. When d-investors choose to roll over, they can also increase their domestic investment by withdrawing a units from their foreign position at no cost (i.e., repatriation). To simplify, we assume there is no partial repatriation, so the decision of how much to repatriate is binary, $a = \{0, (1-\beta)\}$.

Sudden Stop Definitions. A "foreigners' sudden stop" is a situation in which the f-investor withdraws all her investment from the domestic economy. A *sudden stop in net capital flows* is defined as a situation in which the size of withdrawals is such that the country becomes insolvent (i.e., $\ell > \theta$). A "prevented sudden stop" is defined as a situation in which, given a foreigners' sudden stop, there is an offsetting behavior from d-investors such that the economy remains solvent and the return R on investment materializes.

Equilibrium. In this sequential-move game a unique trigger equilibrium is characterized by a 7-tuple $\left(y^*, \underline{x}^*, \underline{x}^{**}, \bar{x}^{**}, \bar{x}^*, \underline{\theta}^*, \bar{\theta}^*\right)$ such that: (i) the f-investor decides to roll over if her private signal y is greater than the threshold point y^*. (ii) After observing the f-investor roll over her position, the d-investors decide to roll over their domestic investment if $x_i > \underline{x}^*$. (iii) After observing the f-investor roll over her position, the d-investors decide to roll over their domestic investment and repatriate safe foreign assets if $x_i > \underline{x}^{**}$. (iv) After observing the f-investor withdraw her position, the d-investors decide to roll over their domestic investment if $x_i > \bar{x}^*$. (v) After observing the f-investor withdraw her position, the d-investors decide to roll over their domestic investment and repatriate foreign assets if $x_i > \bar{x}^{**}$. (vi) A threshold fundamental $\theta > \bar{\theta}^*$ such that the economy is solvent when the f-investor withdraws her positions. And, (vii) a threshold fundamental $\theta > \underline{\theta}^*$ such that the economy is solvent when the f-investor rolls over her position.

2.1 Model Solution

We focus in this section on the implications of foreigners' and prevented sudden stops derived from the model; that is to say, the trigger strategies derived after the withdrawal by the f-investor. All remaining equilibrium conditions for the case when the f-investor rolls over her position are presented in the online appendix.

Problem 1. *(F-investor) Calling* 1 *the action of "withdrawal" and* 0 *the action of "roll over,"* *payoffs are described as:*

$$
\begin{aligned}
u(1,\bar{\theta}^*,\theta) &= (1+r^f)\left[\kappa(1-\beta)+(1+\beta)\right] \\
u(0,\bar{\theta}^*,\theta) &= \begin{cases} R(1-\beta)+(1+r^f)(1+\beta) & \text{if} \quad \theta > \bar{\theta}^* \\ (1+r^f)(1+\beta) & \text{if} \quad \theta \leq \bar{\theta}^* \end{cases}
\end{aligned}
\tag{3}
$$

Thus, having received a signal y, a critical signal y^* is implicitly defined, such that the expected utility from rollover equals that of withdrawal:

$$
Pr\left(\theta \geq \bar{\theta}^*|y=y^*\right)u\left(0,\bar{\theta},\theta \geq \bar{\theta}^*\right) + Pr(\theta \leq \bar{\theta}^*|y=y^*)u\left(0,\bar{\theta},\theta \leq \bar{\theta}^*\right) = u(1,\bar{\theta}^*,\theta) \tag{4}
$$

From equation 3, when the f-investor attacks the domestic economy, the funds $\kappa(1-\beta)$ obtained from early withdrawal are invested jointly with her initial position in the safe asset. But, when the f-investor rolls over her position, her utility depends on the solvency of the economy. In the case when the economy becomes solvent, she gets return R and r^f from her local and foreign investment, respectively. And in the case when the economy becomes insolvent, the return on her domestic position is zero and her wealth is limited to the initial investment in the safe asset. In equation (4) a threshold $y = y^*$ is defined as the level of fundamentals at which the f-investor is indifferent between attacking or defending the domestic economy.

Proposition 1. *Define $\omega = \frac{(1+r^f)\kappa}{R}$. (i) There exists a threshold $y^* = \bar{\theta}^* + \tau\mathbf{\Phi}^{-1}(\omega)$ such that for any realization $y < y^*$ there is a foreigners' sudden stop. (ii) For any given θ, the function $y(\theta)$ is increasing in the risk free rate (r^f) and the face value of early withdrawals (κ).*

where $\mathbf{\Phi}^{-1}$ is the inverse of the c.d.f of a standard Normal distribution. A low signal $y \leq y^*$ about fundamentals leads the large creditor to withdraw her funds, triggering a foreigners' sudden stop (as inflows become negative). Thus, given the compact support for y, the increase in y^* is associated with a higher probability of a foreigners' sudden stop.

What affects the incidence of a foreigners' sudden stop? According to proposition 1, an increase in foreign interest rates r^f and an increase in the face value of funds available after withdrawal κ rise the likelihood of a foreigners' sudden stop. This is the case as both r^f and κ increase the value of withdrawals. In that scenario, investors require a higher realization of domestic fundamentals to roll over their positions on the domestic economy, making a foreigners' sudden stop more likely for a larger set of possible realizations of the domestic fundamentals.

Problem 2. *(Small d-investors) Calling* 1 *the action of "withdrawal" and* 0 *the action of "roll over," after a foreigners' sudden stop when the exchange rate depreciates to* $\tilde{e} > 1$*, d-investors payoffs are described as:*

$$\begin{aligned} u(1, a, \bar{\theta}^*, \theta) &= \tilde{e}(1 + r^f)\left[\frac{1}{\tilde{e}}\kappa(1+\beta) + (1-\beta)\right] \\ u(0, a, \bar{\theta}^*, \theta) &= \begin{cases} R\left[(1+\beta) + \tilde{e}a\left(\bar{x}^{**}\right)\right] + \tilde{e}(1+r^f)\left[(1-\beta) - a\left(\bar{x}^{**}\right)\right] & \text{if} \quad \theta > \bar{\theta}^* \\ \tilde{e}(1+r^f)\left[(1-\beta) - a\left(\bar{x}^{**}\right)\right] & \text{if} \quad \theta \leq \bar{\theta}^* \end{cases} \end{aligned} \tag{5}$$

Define $\bar{\pi}^* = Pr\left(\theta \geq \bar{\theta}^* | y \leq y^*; x_i = \bar{x}^*\right)$ *and* $\bar{\pi}^{**} = Pr\left(\theta \geq \bar{\theta}^* | y \leq y^*; x_i = \bar{x}^{**}\right)$*, a d-investor* i *(receiving a signal* x_i*) solves for: (i) the critical signal* $x_i = \bar{x}^*$*, which is implicitly defined by:*

$$\bar{\pi}^* u\left(0, a, \bar{\theta}, \theta \geq \bar{\theta}^*\right) + (1 - \bar{\pi}^*) u\left(0, a, \bar{\theta}, \theta \leq \bar{\theta}^*\right) = u(1, a, \bar{\theta}^*, \theta) \tag{6}$$

And, (ii) the critical signal $x_i = \bar{x}^{**}$ *implicitly defined by the following equation:*

$$\bar{\pi}^{**} u\left(0, 1-\beta, \bar{\theta}^*, \theta > \bar{\theta}^*\right) = \bar{\pi}^{**} u\left(0, 0, \bar{\theta}^*, \theta > \bar{\theta}^*\right) + (1 - \bar{\pi}^{**}) u\left(0, 0, \bar{\theta}^*, \theta \leq \bar{\theta}^*\right) \tag{7}$$

There are two decisions made by d-investors. First, they choose between withdrawing (i.e., capital flight) or rolling over (i.e., stay) their domestic positions. Equation (6) compares their expected wealth associated with rolling over the domestic investment (left-hand side) with the returns from triggering a capital flight and investing the proceeds in a safe asset (right-hand side). This defines a threshold $x_i = \bar{x}^*(a)$, such that by the law of large numbers, the fraction of investors that receive a private signal $x_i < \bar{x}^*(a)$ withdraw their domestic investment; while the fraction of investors who receive a private signal $x_i > \bar{x}^*(a)$ roll over. This threshold is a function of the decision to repatriate $a(x^{**})$, because it affects the portfolio balance and the expected returns on domestic and foreign investments.

Second, d-investors decide whether or not to repatriate their safe foreign assets. This decision takes place after they have decided to roll over their domestic investment (i.e., $x_i > \bar{x}^*(a)$). In equation (7), d-investors compare the expected utility of repatriating vs not repatriating the foreign-held safe asset. The solution to this problem entails the definition of a threshold $\bar{x}^{**}$ such that the fraction of d-investors receiving a private signal $x_i < \bar{x}^{**}$ do not repatriate, while the fraction of agents receiving a private signal $x_i > \bar{x}^{**}$ repatriate their foreign assets.

Proposition 2. *For $\frac{\sigma}{\tau} \to 0$: (i) There exists a threshold $\bar{x}^{**} = \bar{\theta}^{*} + \sigma \mathbf{\Phi}^{-1}\left(\frac{\omega}{\kappa}\right)$ such that d-investors with a signal $x_i > \bar{x}^{**}$ repatriate their foreign position:*

$$a^{*}\left(\bar{x}^{**}\right) = \begin{cases} a = 0 & \text{if} \quad x_i \leq \bar{x}^{**} \\ a = 1 - \beta & \text{if} \quad x_i \geq \bar{x}^{**} \end{cases}$$

(ii) There exists a threshold $\bar{x}^{*}(0) = \bar{\theta}^{*} + \sigma \mathbf{\Phi}^{-1}(\omega)$ such that d-investors with a signal $x_i > \bar{x}^{*}(0)$ roll over their domestic investment. (iii) For any given θ, the function $\bar{x}^{*}(\theta)$ is increasing in the recovery value of investment κ and the risk free rate r^f.

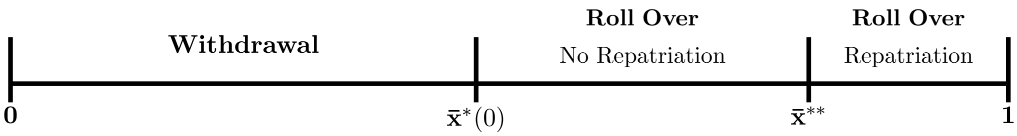
where $\mathbf{\Phi}^{-1}$ is the inverse of the c.d.f of a Standard Normal distribution. Figure 2 depicts the three zones in which the equilibrium conditions for d-investors are defined. Notice that the relevant cutoff is determined at $\bar{x}^{*}(a) = \bar{x}^{*}(0)$, since the first two zones are delimited by the fundamental signal at which d-investors are indifferent between withdrawing or rolling over their investment without repatriation.

What affects the incidence of a capital flight? Proposition 2 presents a scenario where capital flights have the same drivers as a foreigners' sudden stop. More specifically, an increase in foreign interest rates r^f or the face value of funds available after withdrawal κ decrease the opportunity cost of withdrawing and make more attractive investments in safe assets. This increases the chances of a capital flight. Thus, the difference between the behavior of a foreign and a domestic investor is mainly driven by the precision of their signals.

Finally, to close the model we determine the critical value of the fundamental $\bar{\theta}^{*}$ at which the domestic economy is solvent after a foreigners' sudden stop. The solvency condition is granted if the mass of withdrawals does not exceed economic fundamentals (i.e., $\ell < \theta$). Thus, the threshold $\bar{\theta}^{*}$ is determined by the decision of the f-investor to withdraw, the mass of d-investors that receive a signal below the threshold $x_i < \bar{x}^{*}(0)$ and the weight of each investor in the total portfolio in the domestic economy.

Proposition 3. *(Solvency). Define $\pi\left(x^{**}\right) = (1+\beta) + (1-\beta)\left(1 + \tilde{e}Pr\left(x_i \geq \bar{x}^{**} | \theta = \bar{\theta}^{*}\right)\right)$, $\tilde{\lambda}_1 = \frac{1-\beta}{\pi}$ and $\tilde{\lambda}_2 = \frac{1+\beta}{\pi}$: (i) There exists a unique threshold $\bar{\theta}^{*}$ which is a fixed point solution for equation (8), such that for any realization of $\theta < \bar{\theta}^{*}$ there is a net sudden stop as the economy*

Figure 2: Domestic Investors Response



becomes insolvent:

$$\ell(\theta) = \tilde{\lambda}_1 + \tilde{\lambda}_2 Pr\left(x_i \leq \bar{x}^*(0)\middle|\theta = \bar{\theta}^*\right) = \bar{\theta}^* \tag{8}$$

The probability of a sudden stop in net capital flows (insolvency) encompasses the withdrawal from the f-investor and capital flight from some d-investors. The weight of each investor in the total asset allocation is determined by the share of the f-investor ($\tilde{\lambda}_1$) and the d-investors ($\tilde{\lambda}_2$) over the total amount invested in the domestic economy. Initially, the full amount invested in the domestic economy was equal to two: $1 - \beta$ units from f-investor and $1 + \beta$ units from d-investors. However, d-investors that repatriate their foreign investment enlarge their share by the factor $\tilde{e}(1-\beta)Pr\left(x_i \geq \bar{x}^{**}|\theta = \bar{\theta}\right)$, at the expense of other investors' share.

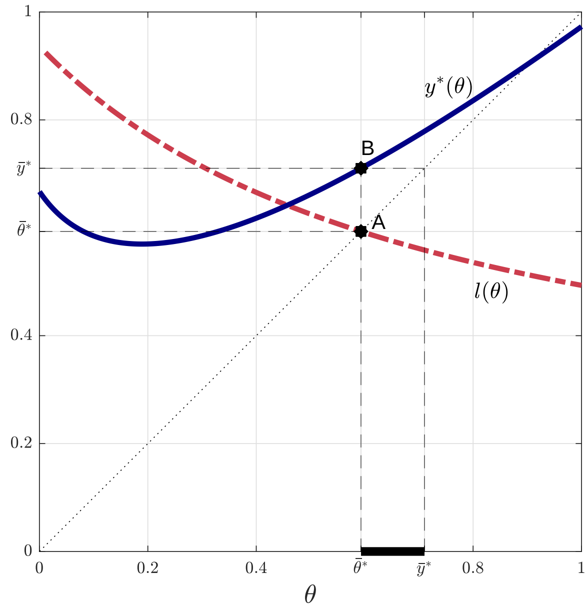
2.2 What Makes Prevention More Likely?

To better understand the dynamics of prevention, Figure 3 depicts graphically f-investor's equilibrium conditions and the solvency equation, as a function of the fundamental θ. The solid blue line corresponds to $\ell(\theta)$ in equation (8) and the dashed red line corresponds to $y^*(\theta)$ -i.e., the threshold for a foreigners' sudden stop- in Proposition 1. These two functions suffice to characterize prevention in the model, since the solvency condition embeds d-investors' decision to withdraw their investment or repatriate their foreign funds.

In Figure 3, the solvency cutoff, $\bar{\theta}^*$, which is the solution to equation 8, is determined by the intersection of the $\ell(\theta)$ curve with the 45-degree line (point A). Next, we evaluate $y^*(\theta)$ at this value to obtain the cutoff for the decision to withdraw of the f-investor, $\bar{y}^* = y^*(\bar{\theta}^*)$ (point B). Then, we project $\bar{y}^*$ on the x-axis through the 45-degree line. These cutoffs define two zones below $\bar{y}^*$. The first zone is in the range $\left[0, \bar{\theta}^*\right]$, where there is a foreigners' sudden stop, and since the economy is insolvent in this region, there is also a net sudden stop. And the second zone in the range $\left[\bar{\theta}^*, \bar{y}^*\right]$ (the black area), where there is a foreigners' sudden stop, but the economy remains solvent. In this range of fundamentals net sudden stops are prevented.

Thus, the main lesson derived from this stylized model is that once a foreigners' sudden stop

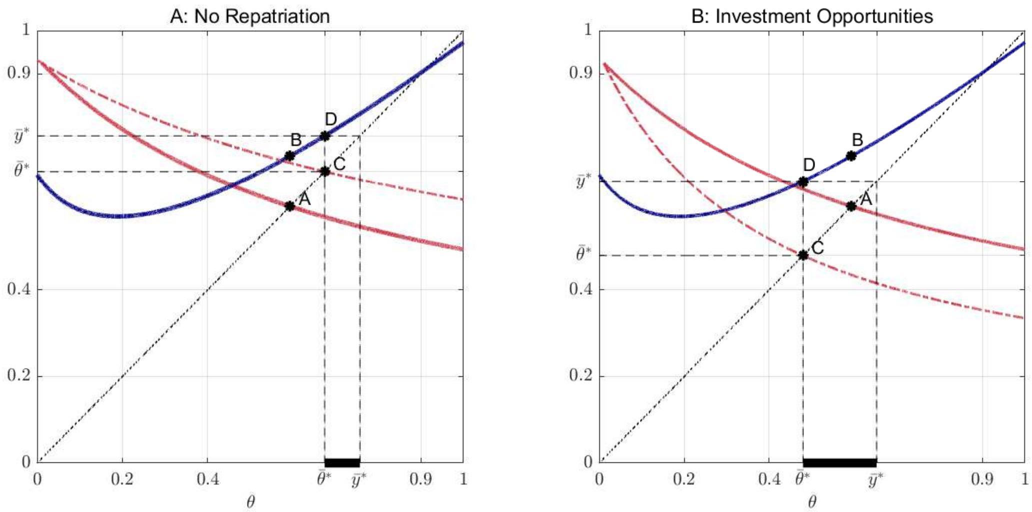
Figure 3: Prevented Sudden Stops



materializes, prevention is not mechanical. It can only occur in a high range of economic fundamentals. This is because the two mechanisms in place to reduce the risk of insolvency and achieve prevention: higher domestic roll over, and repatriation of foreign assets, will only accommodate a foreigners' sudden stop, when the returns expected in the domestic economy are enough to cope with the risk of insolvency. While $R(\theta, \ell)$ is still unknown for investors, it is positively associated with the strength of domestic fundamentals. This is in contrast with existing models of prevention, where the returns from investing are guaranteed at maturity.

In panel A of Figure 4, we present the scenario in which the ability of d-investors to repatriate their foreign resources is limited (e.g., when no foreign investment exists). More specifically, we assume that no repatriation can occur in the model. In that context, the original solvency curve (in solid red) shifts up to a new level (in dashed red), while the curve for f-investors (in solid blue) remains unaltered. This makes both the cutoff for solvency $\bar{\theta}^*$ change from point A to point C and the cutoff for a foreigners' sudden stop $\bar{y}^*$ to increase from point B to D. This is because repatriation plays a role by diluting the weight that f-investors and d-investors that are withdrawing put on the solvency of the economy as seen in equation 8. The lack of repatriation does not preclude the existence of prevention, but the requirements on fundamentals and investment returns for achieving it are higher.

Figure 4: Alternative Scenarios



In panel B of Figure 4, we present the scenario in which domestic investment becomes more profitable. In particular, the depreciation of the exchange rate is larger after a foreigners' sudden stop, meaning that 1 unit of foreign funds repatriated can be transformed into more units of local currency to invest. This will have no direct impact on the f-investor curve (in solid blue), but it will shift down the solvency curve (in solid red). This makes the equilibrium solvency condition to fall from point A to point C. While the cutoff for a foreigners' sudden stop falls from point B to point D. Overall, the existence of profitable investment opportunities in the economy reduce the level of fundamentals required to achieve solvency and increase the range of prevention. However, profitable opportunities do not fully isolate the economy from solvency problems.

To sum up, prevention can occur only in the context of strong domestic fundamentals. This implies that the ability of a country to build resilience in the wake of a foreigners' sudden stop relies on domestic factors that increase the return of domestic investments. In the next section we explore which factors elicit prevention. First, though, we analyze the incidence of prevented sudden stops episodes in the data.

3 On the Empirics of Prevention

3.1 Prevented Episodes

How frequent are prevented sudden stops in the data? To answer this question, we collect balance of payments data for 112 countries between 1980q1 through 2017q4, and use smoothed capital flows series –as described in Appendix B.2– to compute the different episodes of interest.

A *prevented sudden stop* is an event in which a foreigners' sudden stop does not co-exist with a sudden stop in net capital flows. A *foreigners' sudden stop* is defined as an event in which the annual change in gross inflows falls at least two standard deviations below the mean.[10] In terms of measuring its duration, an episode starts from the quarter in which the series falls one standard deviation below the mean, but conditional on the fact that it will eventually cross the two-standard-deviations threshold. The episode ends when the series goes back to one standard deviation below the historical mean. A sudden stop in net capital flows is defined using the same algorithm applied to net capital flows (instead of gross inflows). "Prevention" can happen if and only if changes in gross outflows offset the fall in gross inflows enough to avoid a large fall in net flows that would qualify as a sudden stop in net flows.

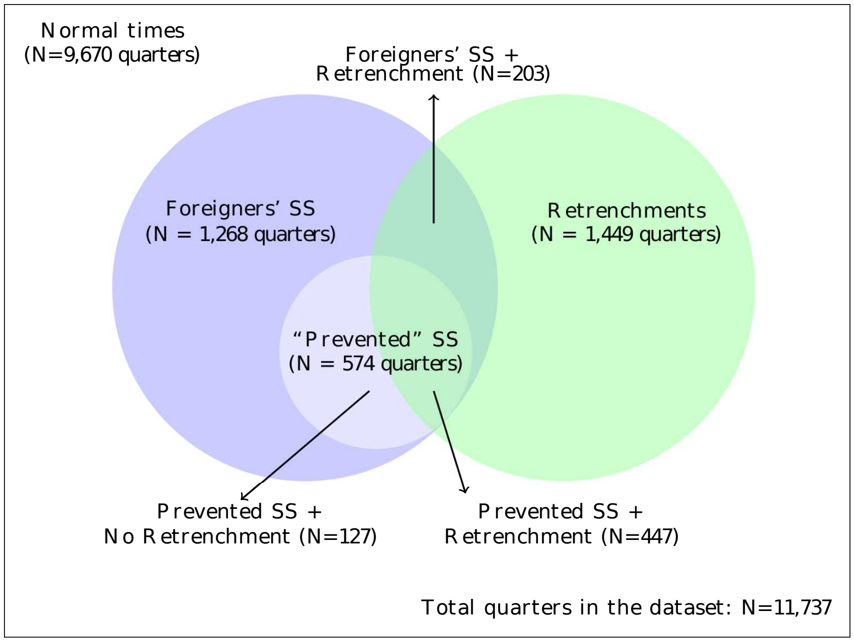
Notice that our definition of prevented sudden stops is different from retrenchments in capital flows. A *retrenchment of capital outflows*, as defined in Forbes and Warnock (2012), is the mirror image of a foreigners' sudden stop but applied to gross outflows: a large shift in the direction of gross outflows in which domestic investors repatriate foreign-held assets. This definition does not consider whether changes in outflows occur in the context of a foreigners' sudden stop, or whether these changes are large enough to offset the change in capital inflows. A retrenchment episode can therefore materialize with or without a contemporaneous foreigners' sudden stop; and with or without a sudden stop in net capital flows.

To get a better understanding of the differences between prevented sudden stops and retrenchments, consider Figure 5. It provides a schematic representation of the prevalence of prevented sudden stops, and its interrelationships with retrenchments. There is a total of 1,268 observations (quarters/country) that fall within foreigners' sudden stop episodes out of a total of 11,737 available observations in the dataset. There are 371 foreigners' sudden stop episodes in the sample, with an average duration of 3.4 quarters per episode ($= 1,268/371$).

Out of the 1,268 observations that fall within foreigners' sudden stop episodes, 574 of them also

[10] The methodology follows the algorithm of Calvo et al. (2004)

Figure 5: A Schematic Representation of Episodes in the Sample



Source. Authors' calculations based on data from IMF-BOPS."SS"=Sudden Stop.

fall within "prevented" sudden stops (totaling 129 episodes), and 694 fall within not-prevented episodes (totaling 242 episodes). In the case of prevented sudden stops, 127 observations (or 29 episodes) out of 574 observations were not accompanied by contemporaneous retrenchments, showing that retrenchments are not a necessary condition for the prevention of a sudden stop. Table 7 in the Appendix provides the list of prevented sudden stops in the sample, including start and end dates.

When considering the case of foreigners' sudden stops that were not prevented, 203 observations (or 111 episodes) out of 694 observations coincide with retrenchments in gross outflows, showing that retrenchments are not always enough to prevent sudden stops. Finally, 55 percent of the observations identified as retrenchments in the sample (=799/1,449 observations) did not materialize during a foreigners' sudden stop. This suggests that most of the retrenchments that are prevalent in the sample are unrelated to crisis episodes.

Given that the focus of this paper is on the determinants of prevention, conditional on a foreigners' sudden stop having already materialized, in the next subsection we will use only the set of foreigners' sudden stops and prevented sudden stops to explore the empirical determinants of prevention. The set of retrenchments identified will be subsequently used in the sensitivity analyses to underscore the different determinants of prevented sudden stops and retrenchments.

3.2 Determinants of Prevention

The theoretical framework suggests that the mechanism through which prevention occurs is tightly connected to the strength of domestic fundamentals. In this subsection, we employ a sequential logit model,[11] which entails the estimation of separate logit regressions for foreigners' sudden stops and for prevented sudden stops respectively, restricting the sample in the second stage only to those countries that are already in a foreigners' sudden stop.[12]

In the first stage of the sequential logit, we estimate the likelihood of a foreigners' sudden stop (FSS) using the full sample available as shown in equation 9:

$$Prob(FSS_{it} = 1|\mathbf{w}, \mathbf{x}) = \Lambda \left(\mathbf{w}'\beta_1^G + \mathbf{x}'\beta_1^D\right) \tag{9}$$

where Λ indicates the logistic cumulative distribution, $\mathbf{w}$ a set of external conditions, $\mathbf{x}$ a set of domestic conditions and $\left\{\beta_1^G, \beta_1^D\right\}$ are vectors of parameters. In a second stage, we restrict the sample only to those countries that in the previous stage experienced a sudden stop in gross inflows to compute the likelihood that these episodes are prevented as presented in equation (10):

$$Prob(Prev_{it} = 1|\mathbf{w}, \mathbf{x}, FSS_{it} = 1) = \Lambda \left(\mathbf{w}'\beta_2^G + \mathbf{x}'\beta_2^D\right) \tag{10}$$

The set of determinants of sudden stops to be used in the econometric exercise encompasses most explanatory variables that have been considered in the literature. We classify explanatory variables into external and domestic

Regarding external factors, following Forbes and Warnock (2012) we consider four explanatory variables: global risk, global liquidity growth, global interest rates and world growth.

Global risk. is proxied by stock market volatility in the US, measured as the VXO - the implied volatility index calculated by the Chicago Board Options Exchange - for the period 1986-2017, extended back to 1980 based on Bloom (2009).

Global liquidity growth is quantified using the yearly growth rate of money supply; this measure is computed as the average growth rate of M2 in the United States, Eurozone and Japan and the

[11] Initially proposed by Mare (1981).

[12] In the first stage, we estimate a logit using the full sample to explore the determinants of foreigners' sudden stops across countries and over time. In the second stage, we restrict the sample only to those episodes that in the previous stage experienced a foreigners' sudden stop to analyze the determinants of prevention.

growth rate of M4 for the UK.

Global interest rates are calculated as the average interest rates on long-term government bonds in the United States, core Euro Area and Japan.

Finally, *global growth* corresponds to the year-on-year growth rate in world real GDP. The source of the last three variables is the International Financial Statistics (IFS) database from the IMF.

Regarding domestic variables, the set of explanatory variables included in the baseline regressions are:

GDP growth, defined as the year-on-year growth rate of quarterly real GDP.

Inflation, defined as the country's average CPI inflation rate.

Foreign Liabilities, proxied by "banks foreign borrowing as a share of GDP" from IFS and Bank of International Settlements (BIS).

Financial Openness is captured by the KAOPEN Index developed by Chinn and Ito (2006), which measures a country's degree of capital account openness, normalized values.

For *Institutions*, we use the composite risk rating index produced by the Political Risk Services Group (PRSG). This index aggregates the score across five sub-components available in the database: investment-profile, corruption, bureaucracy quality, government stability and rule of law.

Flexible Exchange Rate (Flex), is measured by the classification of exchange rate regimes constructed by Reinhart and Rogoff (2004) and updated by Iltzezky et al. (2009). Higher values of this indicator variable are associated with more flexible exchange rate regimes.

Inflation targeting (IT), is an indicator variable taking the value of 1 if the country has an inflation targeting regime and zero otherwise.

$IT \times Flex$ is an interaction term comprising the explanatory variables IT and Flex.

Contagion is captured by a dummy variable that takes the value of 1 if a country reports a foreigners' sudden stop in t and there is one large trading partner that suffered a foreigners' sudden stop in $t-1$.

Considering the data availability for all the explanatory variables, the maximum sample size is restricted to 48 countries over the period 1980q1 to 2017q4. This is the sample that is used for the estimations in subsequent sections. Appendix Tables 8 and 9 provide a detailed description of the construction of the dependent and explanatory variables, definitions and data sources, and basic summary statistics, respectively.

3.2.1 Baseline Results

Results are presented in Table 1. Following Forbes and Warnock (2012), all explanatory variables are lagged one quarter, except when stated otherwise.[13] Column (1), labeled "FSS," presents the results of the first stage logit regression. It shows that some of the external explanatory variables are significant determinants of foreigners' sudden stops. In particular, global risk is associated with a higher likelihood of foreigners' sudden stops, and global economic growth is associated with a reduced probability of a crisis. Results also reveal that some domestic explanatory variables affect the probability of foreigners' sudden stops. For instance, higher levels of foreign liabilities, a higher degree of financial openness, and stronger contagion are associated with higher vulnerability to foreigners' sudden stops. On the other hand, higher domestic economic growth is associated with lower vulnerability.

Once the economy has experienced a foreigners' sudden stop, it can then transition into either a sudden stop in net capital flows or a prevented episode. Column (2) in Table 1, labeled "Prevented," has the results on the determinants of prevention. It shows that none of the external factors affect the likelihood of prevention, except for global growth at 10 percent p-value. Instead, lower levels of foreign liabilities, lower inflation, higher economic growth, and better institutions are domestic factors that are associated with a higher probability of preventing a sudden stop.[14]

The estimated coefficients can be used to assess the quantitative impacts of each of the domestic factors to the probability of prevention.[15] For example, based on the coefficient estimate of foreign liabilities in column 2, Table 1 (i.e., -0.077), moving from a country that is at the 75th percentile of the global distribution of foreign liabilities (12 percent of GDP) to a country in the 25th percentile (2 percent of GDP) increases the probability of prevention from 0.32 to 0.49, evaluating all the other explanatory variables at their mean levels. In other words, holding everything else equal, reducing the level of liability dollarization from the one prevalent in Malaysia to that of Colombia

[13] Many of the explanatory variables are exposed to extreme outliers (observations which are 3 times higher (lower) than the interquartile range at the 75th (25th) percentile). To prevent atypical observations from distorting coefficient estimates, we include interaction terms with dummy variables in the baseline regressions that capture extremes values. This procedure avoids reducing the number of observations available for the estimation while controlling for outliers. Interactions are not shown in the tables below but are available upon request.

[14] Adler et al. (2014) find that whether residents play a stabilizing role or not depends on the nature of the external shock. The seemingly different results that we get may be due to the nature of the problem analyzed in each case. In this paper results from the second stage regression capture the decisions of domestic investors conditional on a foreigners' sudden stop having already materialized. This approach is different from the one in Adler et al. (2014), who study the impact of global shocks on retrenchments by domestic investors without conditioning on a preceding foreigners' shock affecting inflows.

[15] Implied probabilities are computed by multiplying the corresponding coefficient estimate with the value of the explanatory variable of interest, holding all the other explanatory variables at the sample mean level

increases the probability of prevention by 53 percent.

In the case of inflation (coefficient estimate -0.128), going from the level of annual inflation of a country in the 75th percentile of the global distribution of inflation (8.4 percent) to a country in the 25th percentile (1.8 percent) increases the probability of prevention by 43 percent, ceteris paribus. Higher economic growth (coefficient estimate 0.16) is also associated with higher prevention probability. Moving from the average real GDP growth of the country in the 25th percentile of the global distribution (1.3 percent), to the growth rate of the country in the 75th percentile (5.2 percent), increases the probability of prevention by 32 percent, ceteris paribus. In the case of institutions (coefficient estimate 0.052), the impact is even stronger. Moving from the average level of the country in the 25th percentile of the global distribution (index = 51 out of 100), to the level of the country in the 75th percentile (index = 68 out of 100), increases the probability of prevention by 48 percent, ceteris paribus.

The other statistically significant coefficient estimates in column (2) of Table 1 relate to the exchange rate and monetary regimes. The results show that the degree of exchange rate flexibility (Flex) per se is not relevant in explaining either transitions into foreigners' sudden stops (column 1) or the subsequent likelihood of prevention (column 2).[16] The coefficient estimate on inflation targeting (IT) is negative and significant in both columns, suggesting that having an IT regime without a flexible exchange rate is associated with a lower probability of a foreigners' sudden stop; and, conditional on one having occurred, then the IT regime without a flexible exchange rate is associated with a lower probability of prevention. The positive and significant estimated coefficients of the interaction terms IT $\times$ Flex in columns 1 and 2 –which in the latter case, is twice as large in magnitude as the coefficient estimate on IT in that column – suggests that an IT regime combined with exchange rate flexibility does not affect the probability of a foreigners' sudden stop, while it is associated with a higher likelihood of prevention.[17] Table 2 shows the implied probabilities of prevention calculating the marginal effects from the coefficient estimates in column (2) in Table 1 under three scenarios. While effective sample sizes for the different possible combinations vary significantly, as shown in the table, some conclusions can be drawn from the estimated probabilities of prevention under the three scenarios. For countries without

[16] This result is robust to the use of coarse classification in Iltzezky et al. (2009) and to differences with respect to mean as in Cifuentes and Jara (2014) (results are not shown here).

[17] When the interaction term is excluded from the regression (not reported) the coefficient estimates of IT and Flex are not statistically significantly different from zero in both columns. This suggests that, neither IT nor Flex per se are associated with changes in the probability of a foreigners' sudden stop (column 1) or prevented sudden stops (column 2).

an inflation targeting regime and flexible exchange rates, the estimated probability of prevention is 0.29 (column 1). For inflation targeters that operate without a de facto flexible exchange rate -they are few in the sample because the combination signals an inconsistent monetary regime- the implied probability of prevention is almost zero (column 2). Instead, for inflation targeters that operate with a de facto flexible exchange rate, the implied probability increases to 0.57 (column 3). We interpret this result as suggesting that having a "consistent" IT regime that involves a commitment to stabilize prices in the economy and allows for exchange rate flexibility is very helpful for prevention.[18]

Finally, columns (3) and (4) in Table 1 show that the determinants of prevention are similar when the sample is split between advanced and developing countries. There are differences in the statistical significance of some coefficient estimates (perhaps due to smaller sample size), but not in the sign. Note, however, that the coefficient estimate of foreign liabilities is 4 times larger (in absolute value) for the developing countries sub-sample, suggesting that maintaining low levels of liability dollarization is a particularly strong determinant of prevention in developing countries.[19]

3.2.2 Robustness Checks

We conduct a battery of sensitivity tests including additional control variables, alternative measures of the variables presented in the baseline regression, and different definitions of sudden stops.

Alternative definitions. Sudden stop episodes were identified using smoothed capital flows series. A potential issue with the methodology is that, while it helps to avoid seasonality effects or random fluctuations in the data, it may create spurious correlation because the explanatory variables are lagged only one quarter in the baseline regression. Therefore, the dependent variable includes by construction information from $t-1$, which is the period concurrent with the explanatory variables included in the model.

[18] In an alternative specification (not reported), we relax the assumption of sequential order by estimating a multinomial logit between 3 categories: normal times, foreigners' sudden stops prevented, and foreigners' sudden stops not prevented. The results are quantitatively similar to the ones discussed in this section. Moreover, we cannot reject the hypothesis that the likelihood ratios are statistically the same in the sequential and multinomial logit. However, we consider the sequential logit as a baseline since it is more aligned with the theoretical framework presented in the previous section.

[19] The results are marginally different across sub-samples in the case of the FSS columns –not reported in this table – compared to those of the full sample reported in column (1). The biggest difference is that the estimated coefficient for foreign liabilities is not statistically significant in the case of advanced economies although the point estimate is roughly similar (0.016 in the unreported FSS column of the sub-sample, vs. 0.028 in column (1))

There are two ways to deal with this issue. The first is to lag the explanatory variables more than one quarter. The problem with this solution is that, to avoid any concurrent periods between left- and right-hand variables in the regression, it would require introducing the 9th lag of the explanatory variable (equivalent to two years of data) into the regression, thereby limiting sample size and leading to weak correlations. An alternative solution is to change the way the dependent variable is constructed. Instead of annualizing the raw capital flows data first (equation 15 in Appendix B.2), and then computing the change of the annualized series (equation 16 in Appendix B.2), an alternative is to compute equations 15 and 16 based on yearly changes of quarterly series. This introduces more volatility into the underlying capital flows series and therefore results in a different set of episodes, but it has the advantage of avoiding concurrent periods between the dependent variables (which uses information from periods t and $t-4$ only) and the explanatory variables (which uses information from period $t-1$).

Columns (1) and (2) of Table 3 show the results based on the alternative definition of episodes. Columns (3) and (4) show the results of the prevented column for advanced and for developing countries respectively. Reassuringly, the baseline results are largely unaffected by this change, except for the loss of statistical significance of some of the estimated coefficients, especially in the sub samples. We conclude that the results are robust to alternative definitions.

Including additional explanatory variables. We include additional explanatory variables to the set of domestic factors. The variables are:

- *Current account/Absorption of tradable goods (CA/TA)*, as a proxy of potential changes in the real exchange rate when a sudden stop materializes, following Calvo et al. (2008).[20]
- *Financial depth*, proxied by private credit by banks. This variable is measured using "deposit money banks and other financial institutions claims on the private sector as a percentage of GDP," obtained from IFS.
- *Trade openness.* Ratio of real exports plus real imports over GDP.

These variables have been shown to be associated with different types of crises in the literature. However, we do not include them in the baseline because doing so would restrict the sample due to limited data availability of these variables at the quarterly frequency. The data limitations

[20]The absorption of tradable goods is computed as imports plus tradable output domestically consumed. The latter is calculated as the sum of agricultural and industrial output – obtained from the World Development Indicators (WDI) constructed by the World Bank – minus exports.

notwithstanding, the results in Table 4 show that the baseline results are robust to the inclusion of the additional explanatory variables. Among the new control variables included, the only one that shows up as statistically significant is private credit by banks. The coefficient estimate in column 1 suggests that when credit is growing fast, then the probability of a foreigners' sudden stop is higher. And, conditional on a foreigners' sudden stop having materialized, faster domestic credit growth is associated with a lower probability of prevention (column 2), although the statistical significance of the latter coefficient estimate is lower. These results do not change significantly when the sample is split between advanced and developing countries (columns 3 and 4).

Prevention vs Retrenchment. While the focus of this paper is on the determinants of prevented sudden stops, a strand of the literature has focused on two sets of distinct events that are related to prevented sudden stops: "sudden stops in capital inflows" (which we define as foreigners' sudden stops) and "retrenchments of capital outflows" (see, for example, Forbes and Warnock (2012) and Cifuentes and Jara (2014)).

As shown in preceding sections, foreigners' sudden stops and retrenchments of capital outflows may or may not coincide in time, and the latter may or may not be large enough to offset a foreigners' sudden stop. In this section we probe deeper into the interrelationships between the different episodes in the sample by assessing whether prevented sudden stops that are accompanied by retrenchments of outflows have different determinants than prevented sudden stops without retrenchments.

We begin by splitting the 371 foreigners' sudden stops episodes in the sample (equivalent to $N = 1,268$ quarter/country observations) into four groups: (A) prevented sudden stops with concurrent retrenchment of outflows ($N = 447$); (B) prevented sudden stops with no concurrent retrenchment of outflows ($N = 127$); (C) foreigners' sudden stops (not prevented) with concurrent retrenchment of outflows ($N = 203$); and (D) foreigners' sudden stops (not prevented) with no concurrent retrenchment of outflows ($N = 491$).

Next, we use a multinomial logistic regression to explore the determinants of the episodes in each group. Considering that the dependent variable is split into four groups, the multinomial regression model estimates three logit equations using one of the groups as the reference category. The basic setup is the same as in the standard logit regression, the only difference being that the dependent variable is categorical (four groups) rather than binary as we had in the second stage logit regressions reported in previous sections. Results must thus be interpreted as the determinants of each group in relation to the reference category (in this case, group D).

Interestingly, results reported in column (1) and (2) of Table 5 suggest that the determinants of groups A ("prevented with retrenchments") and group B ("prevented without retrenchment") are similar: lower levels of foreign liabilities, better institutional quality and the combination of an inflation targeting regime with flexible exchange rate are associated with higher probability of occurrence of both types of episodes relative to group D ("no prevention, no retrenchment"). There are, however, some differences. The coefficient estimates on domestic GDP growth, inflation and contagion are statistically significant in column (1) only. In contrast, the set of determinants of group C ("no prevention with retrenchment") that are statistically significant are different than the ones for groups A which encompass retrenchment episodes that were also prevented sudden stops. This suggests that the determinants of retrenchment that do not lead to prevention are different from the determinants of retrenchment that lead to prevented sudden stops (with the exception of institutions and contagion). These results confirm the results in (Cavallo et al., 2017) which show, using a different methodology, that the determinants of a set of episodes that combine foreigners' sudden stops with retrenchment are different from the determinants of a prevented sudden stop, and they highlight the relevance of studying the specific type of episodes analyzed in our paper, i.e., prevented sudden stops.

Preventing Sudden Flights. The final sensitivity test consists of switching the roles of inflows and outflows in the determination of prevented sudden stops to probe into the mechanisms that we claim are at work. An alternative explanation of the prevalence of domestic factors for prevention could be that external factors affect gross inflows in general, while domestic factors determine only gross outflows. The results in this section suggest that this is not the case.

To see why, note that a prevented sudden stop has a specific sequencing: it is a foreigners' sudden stop (originating from a reduction in gross inflows) that is offset by a movement in gross outflows in the opposite direction. However, a prevented sudden stop could also be identified by applying the same statistical algorithms to gross inflows and outflows in a different sequence. In particular: an increase in gross outflows (i.e., a sudden "capital flight" by resident investors) can turn into a prevented sudden stop if concurrently there is an offsetting effect coming from a "surge" in the inflows from foreigners. If there is no concurrent surge of inflows, then the capital flight can lead to a sudden stop in net capital flows similar to what would happen with a foreigners' sudden stop that is not offset by residents.[21]

Even though the prevented sudden stops generated by switching the roles of inflows and outflows may be observationally equivalent in the data (i.e., a placebo), the economic mechanisms underlying them are different. In the model of section 2, the initial trigger is external to the affected economy, and the response from resident investors is driven by country-idiosyncratic factors. In the placebo-like prevented sudden stops, the sequencing between domestic and external factors driving the dynamics is different. Therefore, when we apply the empirical model to the placebo-type prevented sudden stops we expect to find different results. That is indeed the case considering the results that are reported in Table 6.

Column (1) in Table 6 labeled "Locals" is the equivalent to the "FSS" columns in the baseline sequential logit regressions. It captures the probability of a sudden increase in gross outflows driven by resident investors (i.e., "locals"). The results suggest that external explanatory variables, in particular: global risk and global growth, are significant determinants of this type of episodes. Coefficient estimates imply that higher global risk is associated with a lower likelihood of a sudden increase in gross outflows, and that higher global economic growth is associated with a higher likelihood. Interestingly, this is the opposite to what we found in the baseline regressions, suggesting that the nature of the underlying shocks is quite different in the case of the placebo-like episodes. This, notwithstanding the fact that external factors are significant in this regression, suggests that external factors affect the dynamics of gross outflows. In terms of the domestic factors, only GDP growth appears to be a significant determinant. Column (2) in Table 6 labeled "Prevented," shows that domestic factors do not influence the likelihood of prevention. This is also different from the baseline regressions where domestic factors entered as the predominant determinants.

Columns (3) and (4) replicate the same exercise considering "bonanza-filtered episodes." Bonanza-filtered episodes capture the feature that favorable terms of trade shocks can add a source of external financing to the economy that is materializing through the current account of the balance of payment instead of the financial account. In such circumstances, gross outflows may suddenly increase as resident investors try to diversify investment portfolios internationally following the positive income shock. We evaluate the determinants of placebo-like prevented sudden stops by restricting the sample of episodes in the second stage, only considering those that occur when there is not a positive terms of trade shock.[22] This is interesting because when bonanza episodes

[21] Cowan et al. (2008) show that the sudden stop of Chile in the late 1990s was driven by a capital flight, and not by a sudden stop in inflows.

[22] We construct bonanza-filtered episodes similarly to episodes of extreme capital flows variations. First, a bonanza

are excluded, it is more likely that the set of remaining placebo-like prevented sudden stops are more similar to the prevented sudden stops that we identify using the original sequencing between inflows and outflows. This is so because, by excluding bonanza related episodes, we increase the probability that the remaining episodes are "crisis driven" as in the original setup.

Changes in the results in columns (3) and (4) in relation to columns (1) and (2) are revealing. There are no significant changes in column (3) compared to column (1), except for the coefficient estimate on domestic growth, which is not statistically significant in column (3), and the coefficient estimate on institutions which is positive and significant. However, the more striking differences arise when comparing columns (4) and (2). When bonanza episodes are excluded from the sample, domestic factors, i.e., foreign liabilities and inflation, re-emerge as significant determinants of prevention in column (4) with the same signs as in the baseline regressions. In other words, the results that emerge when restricting the sample to bonanza-filtered episodes are, as expected, more similar to the baseline results than those that emerge from the full sample of placebo-like prevented sudden stops.

4 The Benefits of Sudden Stop Prevention

Why is it important to focus on prevention? One rationale for caring about the determinants of prevention is that sudden stops in net capital flows impose larger output losses on affected economies than prevented sudden stops. To see this, we study the response of output growth to a set of different scenarios. We build impulse response functions using the local projections method as in Jordà (2005).

First, we estimate model (11) to assess the dynamics of output growth after a foreigners' sudden stop and how these dynamics are affected when the episode is prevented.

$$\Delta_h y_{i,t+h} = \alpha_{i,h} + \beta^h FSS_{i,t} + \delta^h Prev_{i,t} + \xi^h \mathbf{x}_{i,t} + \varepsilon_{i,t+h}, \tag{11}$$

for $h = 0, 1, ..., 5$. Here i and t index countries and years, respectively. $y_{i,t}$ is the log of real annual GDP. The variable $\Delta_h y_{i,t+h} \equiv y_{i,t+h} - y_{i,t-1}$ is the cumulative GDP growth between period $t-1$ and period $t+h$. $FSS_{i,t}$ is a dummy variable that takes a value of 1 if t coincided with a foreigners'

is defined as a terms of trade window in which the seasonally adjusted terms of trade rise above two standard deviations from the historical mean. A bonanza episode starts when the terms of trade increase one standard deviation above the historical mean, and it ends when the terms of trade fall below the one standard deviation threshold.

sudden stop episode and zero otherwise. $Prev_{i,t}$ is a dummy variable that takes a value of 1 if t coincides with a prevented sudden stop episode, and zero otherwise. The vector of controls $\mathbf{x}_{i,t}$ includes lags of the growth rate.

Results for model (11) are depicted in Figure 6. The impact of a foreigners' sudden stop episode is captured by the coefficients β^h. In Panel A, we observe that foreigners' sudden stops are associated with approximately 4 percent below-average growth in the 5 years following the start of the episode. The estimated impact is statistically significant at the 95 percent confidence level. Instead, $\beta^h + \delta^h$ - depicted in Panel C - captures growth dynamics after a prevented sudden stop. Prevention effectively offsets about one-half of the negative growth effect of a foreigners' sudden stop. The cumulative effect is such that the negative growth impact of foreigners' sudden stops that are prevented is approximately 2 percent of GDP smaller on average, 5 years after the episode, than a foreigners' sudden stop that is not prevented. Coefficient δ^h in Panel B shows that the difference in growth between a prevented sudden stop and one that is not prevented is about 2 percent of GDP, and it is statistically different from zero.

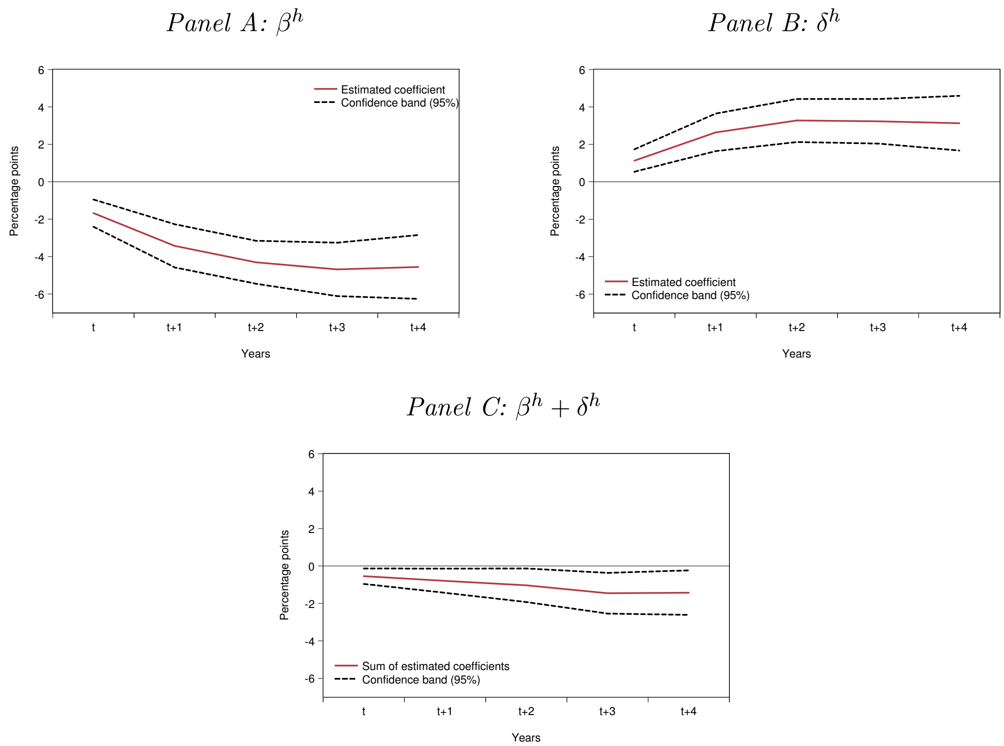
To sum up: "prevention" significantly reduces the output costs of foreigners' sudden stop (i.e., dampens the estimated negative growth impacts of the crisis). This is why it is so important to assess how countries can increase resiliency to external shocks by eliciting prevention.

5 Conclusion

The global financial crisis of 2008/09 made it clear that all countries are vulnerable to the risk of a cut-off in international credit. However, it also became evident that some countries were more successful than others in preventing a fall in gross inflows from turning into a costly sudden stop in net capital flows. This was important because countries that could avoid sudden stops in net capital flows could also avoid the ensuing costly adjustments that are usually associated with them.

Why are some countries more resilient than others in the aftermath of the same underlying shocks? More specifically, what are the factors that enable some countries to prevent full-fledged sudden stops in net capital flows? From a theoretical point of view, the answer is strong fundamentals. From an empirical perspective, the answer is that they are mostly "domestic factors," meaning that they are factors that are amenable to policy interventions. Keeping low levels of liability dollarization, having a strong institutional framework, keeping inflation in check, and having credible and consistent monetary regimes help to increase resilience to external financing shocks.

Figure 6: Impulse Responses of GDP Growth to Sudden Stops - Model 1



Source. Authors' calculations. The panels show selected coefficient estimates from Equation 11. The coefficient estimates represent the accumulated impact of the foreigners' sudden stop on real GDP growth, with and without prevention, up to five years following the shock. Standard errors to compute the 95 percent confidence bands are calculated using the methodology proposed by Driscoll and Kraay (1998), controlling for serial and spatial correlation.

The methodology exploits the sequential nature of the episodes under study. First, countries may or may not experience a cut-off in international credit driven by foreigners' actions. Second, those countries that experience a foreigners' sudden stop can prevent it from becoming a sudden stop in net capital flows, or not, depending on the behavior of local investors.

There is analytical value-added in focusing on prevented sudden stops. These are a specific type of crisis-related episode that, to the best of our knowledge, has not yet been analyzed. In particular, prevented sudden stops are different from retrenchments in gross outflows, which have received much more attention in the literature. While retrenchments in gross outflows can sometimes trigger a prevented sudden stop, they are neither necessary nor sufficient to cause prevention. Moreover, many retrenchments in the data are actually related to positive rather than negative external shocks, and therefore have different consequences on the economy, and different determinants.

Results show that while it may not be possible for countries to insulate themselves completely from the volatility of gross inflows, they still have control over the specific set of factors that can help to prevent that volatility from forcing potentially costly external adjustments. It is only under favorable domestic conditions that local investors may want to roll over domestic investments or repatriate foreign asset holdings when foreigners stop lending, thereby helping to prevent a sudden stop in net capital flows.

Table 1: Determinants of Prevented Sudden Stops

	Baseline			
	FSS	Prevented		
		Full-Sample	Advanced	Developing
	(1)	(2)	(3)	(4)
External Factors				
Global Risk (lag 1)	0.036***	-0.017	-0.018	0.009
	(0.008)	(0.014)	(0.022)	(0.026)
Global Liquidity Growth (lag 1)	0.001	0.008	0.007	0.005
	(0.002)	(0.006)	(0.008)	(0.014)
Global Growth (lag 1)	-0.248***	-0.195*	-0.435***	0.122
	(0.060)	(0.101)	(0.137)	(0.207)
Global Interest Rates (lag 1)	-0.037	-0.117	-0.109	-0.900*
	(0.035)	(0.112)	(0.145)	(0.477)
Domestic Factors				
Foreign Liabilities (lag 1,% GDP)	0.028***	-0.077***	-0.060**	-0.215***
	(0.007)	(0.025)	(0.027)	(0.067)
GDP Growth (lag 1)	-0.136***	0.160***	0.237***	0.148*
	(0.024)	(0.044)	(0.073)	(0.088)
Inflation (lag 1)	-0.002	-0.128**	-0.210*	-0.106
	(0.006)	(0.054)	(0.126)	(0.081)
Institutions	0.002	0.052**	0.050	0.036
	(0.010)	(0.023)	(0.035)	(0.046)
Contagion	0.506***	0.273	0.252	-0.226
	(0.177)	(0.317)	(0.505)	(0.522)
Financial Openness	0.006**	0.007	0.001	0.016*
	(0.003)	(0.007)	(0.020)	(0.009)
Flexible Exchange Rate (Flex)	-0.059	-0.888	-1.578*	1.534
	(0.184)	(0.675)	(0.835)	(1.294)
Inflation Targeting (IT)	-0.687**	-2.177**	-1.410	-2.659*
	(0.335)	(1.011)	(2.294)	(1.469)
IT×Flex	0.658*	4.214***	3.650	3.173
	(0.354)	(1.235)	(2.445)	(1.934)
Observations	4,956	725	411	283

Notes: The dependent variable in column (1), denoted by "FSS," corresponds to a dummy that takes the value 1 if the country experienced a foreigners' sudden stop, and zero otherwise. The dependent variable in column (2), denoted by "Prevented," corresponds to a dummy that takes the value 1 if the country experienced a prevented sudden stop, and zero otherwise. For details on the definitions of the dependent and independent variables see Table 8 in Appendix C. Estimates are obtained using a logit model and robust standard errors clustered by country, unless otherwise stated. Interaction terms with dummies that capture extreme values for the regressors are included in the regression. An extreme value is defined as one that is three interquartile ranges above the 75th percentile or below the 25th percentile. Standard errors are reported in parenthesis. *** (**) [*] denotes significance at the 1 (5) [10] percent level.

Table 2: Implied Probability of Prevention under Alternative Exchange Rate and Monetary Regimes

	IT=0 - Flex =0	IT=1 - Flex=0	IT=1 - Flex=1
Implied Probability	0.29	0.03	0.57
Observations in the sample	58%	0.05%	12%

Note: The implied probabilities are calculated using the coefficient estimates from column (2) in Table 1 as follows: in column (1), the coefficient estimates of inflation targeting (IT), the exchange rate regime (Flex) and the interaction term (ITxFlex) are multiplied by zero (because IT = Flex = 0), and all other explanatory variables are set at the sample mean. In column (2), the coefficient estimates of Flex and ITxFlex are multiplied by zero (because Flex = 0), the coefficient estimate of IT is multiplied by 1, and all other explanatory variables are set at the sample mean. In column (3), the coefficient estimates of IT, Flex and ITxFlex are multiplied by one (because IT = Flex = 1), and all other explanatory variables are set at the sample mean.

Table 3: Determinants of Prevented Sudden Stops: Alternative Definition of Episodes

	Baseline			
	FSS	Prevented		
		Full-Sample	Advanced	Developing
	(1)	(2)	(3)	(4)
External Factors				
Global Risk (lag 1)	0.037***	0.034	-0.005	0.015
	(0.007)	(0.017)	(0.023)	(0.025)
Global Liquidity Growth (lag 1)	0.023	0.037	-0.004	0.003
	(0.002)	(0.007)	(0.010)	(0.010)
Global Growth (lag 1)	-0.27***	-0.22***	-0.325**	-0.241*
	(0.061)	(0.089)	(0.135)	(0.135)
Global Interest Rates (lag 1)	-0.026	-0.095	-0.044	-0.309*
	(0.033)	(0.059)	(0.076)	(0.168)
Domestic Factors				
Foreign Liabilities (lag 1,% GDP)	0.028***	-0.057**	-0.015	0.009
	(0.006)	(0.011)	(0.019)	(0.015)
GDP Growth (lag 1)	-0.13***	0.017***	0.059	0.117***
	(0.020)	(0.029)	(0.045)	(0.039)
Inflation (lag 1)	-0.001	-0.17***	-0.073	0.010
	(0.006)	(0.034)	(0.100)	(0.047)
Institutions	-0.004	0.032	-0.015	0.009
	(0.009)	(0.013)	(0.021)	(0.021)
Contagion	0.55***	-0.25	1.214**	0.458
	(0.173)	(0.347)	(0.554)	(0.457)
Financial Openness	0.007*	-0.006	0.007	0.011**
	(0.003)	(0.004)	(0.013)	(0.005)
Flexible Exchange Rate (Flex)	-0.309	0.186	-0.238	0.363
	(0.303)	(0.390)	(0.549)	(0.587)
Inflation Targeting (IT)	-0.683**	-1.21	-0.726*	-0.153
	(0.150)	(0.307)	(0.425)	(0.581)
IT×Flex	0.51*	3.004**	-0.008	0.859**
	(0.169)	(0.290)	(0.532)	(0.365)
Observations	4,694	862	453	409

Notes: The dependent variable in column (1), denoted by "FSS," corresponds to a dummy that takes the value 1 if the country experienced a foreigners' sudden stop, and zero otherwise. The dependent variable in column (2), denoted by "Prevented," corresponds to a dummy that takes the value 1 if the country experienced a prevented sudden stop, and zero otherwise. For details on the definitions of the dependent and independent variables see Table 8 in Appendix C. Estimates are obtained using a logit model and robust standard errors clustered by country, unless otherwise stated. Interaction terms with dummies that capture extreme values for the regressors are included in the regression. An extreme value is defined as one that is three interquartile ranges above the 75th percentile or below the 25th percentile. Standard errors are reported in parenthesis. *** (**) [*] denotes significance at the 1 (5) [10] percent level.

Table 4: Determinants of Prevented Sudden Stops: Additional Regressors

	Baseline			
	FSS	Prevented		
		Full-Sample	Advanced	Developing
	(1)	(2)	(3)	(4)
External Factors				
Global Risk (lag 1)	0.043***	-0.023	-0.019	0.012
	(0.007)	(0.016)	(0.024)	(0.023)
Global Liquidity Growth (lag 1)	0.001	0.008	0.001	-0.003
	(0.002)	(0.008)	(0.010)	(0.013)
Global Growth (lag 1)	-0.258***	-0.178	0.282**	0.309*
	(0.070)	(0.096)	(0.135)	(0.166)
Global Interest Rates (lag 1)	-0.031	-0.084	-0.077	-0.293
	(0.039)	(0.063)	(0.097)	(0.271)
Domestic Factors				
Foreign Liabilities (lag 1,% GDP)	0.027***	-0.079**	-0.021	0.020
	(0.008)	(0.013)	(0.021)	(0.027)
CA/TA (lag 1)	-0.002	-0.002	-0.003	-0.011
	(0.003)	(0.008)	(0.011)	(0.014)
GDP Growth (lag 1)	-0.138***	0.150***	0.121*	0.117**
	(0.024)	(0.033)	(0.063)	(0.049)
Inflation (lag 1)	0.039*	-0.177**	-0.200***	-0.012
	(0.006)	(0.044)	(0.075)	(0.064)
Institutions	-0.003	0.055**	-0.010	0.029**
	(0.010)	(0.012)	(0.021)	(0.022)
Trade Openness (lag 1)	-0.003	0.010	0.006	-0.004
	(0.002)	(0.003)	(0.007)	(0.004)
Contagion	0.451**	0.337	1.162*	0.823**
	(0.182)	(0.386)	(0.690)	(0.406)
Financial Depth (lag 4)	0.007***	-0.008*	-0.001	-0.002
	(0.002)	(0.002)	(0.004)	(0.005)
Financial Openness	0.006**	0.006	-0.001	0.004
	(0.003)	(0.004)	(0.013)	(0.005)
Flexible Exchange Rate (Flex)	-0.267*	-0.59	-0.238	0.363
	(0.303)	(0.390)	(0.549)	(0.587)
Inflation Targeting (IT)	-0.657*	-0.18*	-0.04	-0.42
	(0.150)	(0.307)	(0.425)	(0.581)
IT×Flex	0.700**	4.232***	0.42	0.892**
	(0.169)	(0.290)	(0.532)	(0.365)
Observations	4,310	646	401	344

Notes: The dependent variable in column (1), denoted by "FSS," corresponds to a dummy that takes the value 1 if the country experienced a foreigners' sudden stop, and zero otherwise. The dependent variable in column (2), denoted by "Prevented," corresponds to a dummy that takes the value 1 if the country experienced a prevented sudden stop, and zero otherwise. For details on the definitions of the dependent and independent variables see Table 8 in Appendix C. Estimates are obtained using a logit model and robust standard errors clustered by country, unless otherwise stated. Interaction terms with dummies that capture extreme values for the regressors are included in the regression. An extreme value is defined as one that is three interquartile ranges above the 75th percentile or below the 25th percentile. Standard errors are reported in parenthesis. *** (**) [*] denotes significance at the 1 (5) [10] percent level.

Table 5: Determinants of Prevented Sudden Stops: Prevention vs Retrenchment

	Prevention vs Retrenchment		
	Prev-Retren	Prev-No Retren	No Prev-Retren
	A	B	C
	(1)	(2)	(3)
External Factors			
Global Risk (lag 1)	0.013	-0.016	0.039**
	(0.022)	(0.039)	(0.019)
Global Liquidity Growth (lag 1)	0.013*	-0.006	0.003
	(0.008)	(0.009)	(0.006)
Global Growth (lag 1)	-0.136	-0.123	0.082
	(0.120)	(0.180)	(0.094)
Global Interest Rates (lag 1)	-0.174	-0.178	-0.082
	(0.117)	(0.172)	(0.103)
Domestic Factors			
Foreign Liabilities (lag 1,% GDP)	-0.045**	-0.100**	0.025*
	(0.022)	(0.040)	(0.014)
GDP Growth (lag 1)	0.116***	0.132	-0.048
	(0.043)	(0.081)	(0.039)
Inflation (lag 1)	-0.163***	-0.073	-0.002
	(0.058)	(0.079)	(0.025)
Institutions	0.104***	0.082*	0.076***
	(0.023)	(0.045)	(0.020)
Contagion	0.943**	0.284	1.067***
	(0.382)	(0.550)	(0.323)
Financial Openness	0.010	0.007	0.006
	(0.008)	(0.011)	(0.006)
Flexible Exchange Rate (Flex)	-0.844	0.041	0.298
	(0.616)	(1.026)	(0.406)
Inflation Targeting (IT)	-1.761	-3.642***	0.579
	(1.079)	(0.542)	(0.535)
IT×Flex	3.623***	4.165***	-0.442
	(1.300)	(1.043)	(0.739)
Observations	732	732	732

Notes: The dependent variable corresponds to a categorical variable that takes the value 1 if the country experienced a prevented sudden stop accompanied by a contemporaneous retrenchment (*Prev-Retren*). It takes the value 2 if the country experienced a prevented sudden stop that is not accompanied by a contemporaneous retrenchment (*Prev- No Retren*). It takes the value 3 if the country did not experience a prevented sudden stop, but it did experience a retrenchment (*No Prev-Retren*). Finally, it takes the value 4 if the country experienced neither a prevented sudden stop nor a retrenchment. For the estimation process we choose *No Prev-No Retren* as the base category. Column (1) reports the results for category 1, column (2) reports the results for category 2, and column (3) reports the results for category 3. For details on the definitions of the dependent and independent variables see Table 8 in Appendix C. Estimates are obtained using a multinomial logit model and robust standard errors clustered by country, unless otherwise stated. Interaction terms with dummies that capture extreme values for the regressors are included in the regression. An extreme value is defined as one that is three interquartile ranges above the 75th percentile or below the 25th percentile. Standard errors are reported in parenthesis. *** (**) [*] denotes significance at the 1 (5) [10] percent level.

Table 6: Prevention in a Scenario of Sudden Flights

			Bonanza	
	Locals	Prevented	Locals	Prevented
	(1)	(2)	(3)	(4)
External Factors				
Global Risk (lag 1)	-0.036***	-0.015	-0.053***	0.016
	(0.008)	(0.018)	(0.010)	(0.032)
Global Liquidity Growth (lag 1)	-0.002	0.006	-0.003	0.007
	(0.002)	(0.005)	(0.003)	(0.007)
Global Growth (lag 1)	0.181***	0.091	0.264***	0.197**
	(0.053)	(0.074)	(0.064)	(0.094)
Global Interest Rates (lag 1)	-0.023	0.357***	-0.053	0.326**
	(0.035)	(0.121)	(0.060)	(0.147)
Domestic Factors				
Foreign Liabilities (lag 1,% GDP)	0.015*	-0.023	0.008	-0.056***
	(0.008)	(0.015)	(0.011)	(0.022)
GDP Growth (lag 1)	0.067***	0.000	0.025	0.090
	(0.016)	(0.032)	(0.035)	(0.070)
Inflation (lag 1)	-0.011	-0.001	-0.006	-0.088**
	(0.008)	(0.023)	(0.019)	(0.040)
Institutions	0.010	-0.002	0.046**	0.011
	(0.008)	(0.021)	(0.021)	(0.043)
Contagion	-0.004	-0.007	0.121	-0.021
	(0.106)	(0.172)	(0.136)	(0.279)
Financial Openness	0.003	0.000	0.007	-0.018*
	(0.002)	(0.006)	(0.005)	(0.010)
Flexible Exchange Rate (Flex)	0.003	-0.403	0.176	-0.751
	(0.166)	(0.339)	(0.204)	(0.457)
Inflation Targeting (IT)	-0.089	0.275	-0.116	0.606
	(0.276)	(0.514)	(0.500)	(0.709)
IT×Flex	-0.021	0.177	-0.201	0.113
	(0.374)	(0.640)	(0.576)	(0.743)
Observations	4,956	1,056	4,956	491

Notes: The dependent variable in column (1), denoted by "Locals," corresponds to a dummy that takes the value 1 if the country experienced a sudden increase in gross outflows driven by resident investors (sudden flight), and zero otherwise. The dependent variable in column (2), denoted by "Prevented," corresponds to a dummy that takes the value 1 if the country experienced a prevented sudden stop, and zero otherwise. Columns (3) and (4) are equivalent to columns (1) and (2), but restricting the sample to bonanza-filtered episodes. For details on the definitions of the dependent and independent variables see Table 8 in Appendix C. Estimates are obtained using a logit model and robust standard errors clustered by country, unless otherwise stated. Interaction terms with dummies that capture extreme values for the regressors are included in the regression. An extreme value is defined as one that is three interquartile ranges above the 75th percentile or below the 25th percentile. Standard errors are reported in parenthesis. *** (**) [*] denotes significance at the 1 (5) [10] percent level.

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A Mathematical Appendix

A.1 Proofs

Proposition 1. Define $\omega = \frac{(1+r^f)\kappa}{R}$. (i) There exists a threshold $y^* = \bar{\theta}^* + \tau \mathbf{\Phi}^{-1}(\omega)$ such that for any realization $y < y^*$ there is a foreigners' sudden stop. (ii) For any given θ, the function $y(\theta)$ is increasing in the risk free rate (r^f) and the face value of early withdrawals (κ).

Proof. After some mathematical manipulation, equation 4 can be simplified as:

$$Pr\left(\theta \geq \bar{\theta}^* | y = y^*\right) = \frac{\kappa(1+r^f)}{R} \equiv \omega$$

Using the private signal for the f-investor in equation 1, we can define this probability as:

$$Pr\left(\eta \leq \frac{y^* - \bar{\theta}^*}{\tau}\right) = \mathbf{\Phi}\left(\frac{y^* - \bar{\theta}^*}{\tau}\right) = \omega$$
$$y^* = \bar{\theta}^* + \tau \mathbf{\Phi}^{-1}(\omega)$$

To analyze the impact of change in the risk free rate (r^f) and the face value of early withdrawals (κ), it is convenient to redefine the last equation in terms of the inverse of the error function ($\texttt{erfinv}$), for any given θ. Notice that $\mathbf{\Phi}^{-1}(x) = \sqrt{2}\,\texttt{erfinv}(2x-1)$, thus:

$$y(\theta) = \theta + \tau\sqrt{2}\,\texttt{erfinv}\left(2\omega\left(\theta\right) - 1\right)$$

Changes of the curve $y(\theta)$ to a variation in x, can be expressed as:

$$\frac{\partial y}{\partial x} \propto \frac{\partial \texttt{erfinv}(\cdot)}{\partial x} = \sqrt{\pi}\exp^{\texttt{erfinv}(2\omega(x)-1)^2}\frac{\partial \omega}{\partial x}$$

Therefore, the $sign\left(\frac{\partial y}{\partial x}\right) = sign\left(\frac{\partial \omega}{\partial x}\right)$, since the first term in the previous equation is positive for any given ω. In the case of r^f and κ:

$$\frac{\partial \omega}{\partial r^f} = \frac{\kappa}{R} > 0$$

$$\frac{\partial \omega}{\partial \kappa} = \frac{(1+r^f)}{R} > 0$$

which shows, $y(\theta)$ is increasing in both variables. □

Proposition 2. For $\frac{\sigma}{\tau} \to 0$: (i) There exists a threshold $\bar{x}^{**} = \bar{\theta}^* + \sigma \mathbf{\Phi}^{-1}\left(\frac{\omega}{\kappa}\right)$ such that d-investors with a signal $x_i > \bar{x}^{**}$ repatriate their foreign position:

$$a^*\left(\bar{x}^{**}\right) = \begin{cases} a = 0 & \text{if} \quad x_i \leq \bar{x}^{**} \\ a = 1 - \beta & \text{if} \quad x_i \geq \bar{x}^{**} \end{cases}$$

(ii) There exists a threshold $\bar{x}^*(0) = \bar{\theta}^* + \sigma \mathbf{\Phi}^{-1}(\omega)$ such that d-investors with a signal $x_i > \bar{x}^*(0)$ roll over their domestic investment. (iii) For any given θ, the function $\bar{x}^*(\theta)$ is increasing in the recovery value of investment κ and the risk free rate r^f.

Proof. We begin by finding the solution to $\bar{x}^*$. We impose the condition $a = 0$, since the threshold of interest is associated with roll over without repatriation and withdrawals. After some mathematical manipulation, equation 6 can be simplified as:

$$Pr\left(\theta \geq \bar{\theta}^* | y \leq y^*, x_i = \bar{x}^*\right) = \omega$$

Combining this equation with the signals for f-investor and d-investors in equations 1 and 2, we can redefine this expression as:

$$\begin{aligned} \frac{Pr\left(\theta \geq \bar{\theta}^*, y \leq y^*, x_i = \bar{x}^*\right)}{Pr\left(y \leq y^*, x_i = \bar{x}^*\right)} &= \omega \\ \frac{Pr\left(\epsilon_i \leq \frac{\bar{x}^* - \bar{\theta}^*}{\sigma}, \eta - \frac{\sigma}{\tau}\epsilon_i \leq \frac{\bar{\theta}^* - \bar{x}^*}{\tau} + \mathbf{\Phi}^{-1}(\omega)\right)}{Pr\left(\eta - \frac{\sigma}{\tau}\epsilon_i \leq \frac{\bar{\theta}^* - \bar{x}^*}{\tau} + \mathbf{\Phi}^{-1}(\omega)\right)} &= \omega \end{aligned}$$

Taking the limit as $\frac{\sigma}{\tau} \to 0$, and making use of the independence between signal errors, the previous expression can be further simplified as:

$$\begin{aligned} Pr\left(\epsilon_i \leq \frac{\bar{x}^* - \bar{\theta}^*}{\sigma}\right) =& \mathbf{\Phi}\left(\frac{\bar{x}^* - \bar{\theta}^*}{\sigma}\right) = \omega \\ \bar{x}^* =& \bar{\theta}^* + \sigma \mathbf{\Phi}^{-1}(\omega) \end{aligned}$$

We can follow the same directions to compute $\bar{x}^{**}$:

$$Pr\left(\theta \geq \bar{\theta}^* | y \leq y^*, x_i = \bar{x}^{**}\right) = \frac{\omega}{\kappa}$$

which yields:

$$\bar{x}^{**} = \bar{\theta}^* + \sigma \mathbf{\Phi}^{-1}\left(\frac{\omega}{\kappa}\right)$$

Finally, as in proposition 1, $sign\left(\frac{\partial \bar{x}^*}{\partial x}\right) = sign\left(\frac{\partial \omega}{\partial x}\right)$. The derivatives are equivalent to the ones for the f-investor, we will just rewrite them here for convenience:

$$\frac{\partial \omega}{\partial r^f} = \frac{\kappa}{R} > 0$$

$$\frac{\partial \omega}{\partial \kappa} = \frac{(1 + r^f)}{R} > 0$$

□

Proposition 3. *(Solvency).* Define $\pi\left(x^{**}\right) = (1+\beta) + (1-\beta)\left(1 + \tilde{e}Pr\left(x_i \geq \bar{x}^{**} | \theta = \bar{\theta}^*\right)\right)$, $\tilde{\lambda}_1 = \frac{1-\beta}{\pi}$ and $\tilde{\lambda}_2 = \frac{1+\beta}{\pi}$: (i) There exists a unique threshold $\bar{\theta}^*$ which is a fixed point solution for equation (A.1), such that for any realization of $\theta < \bar{\theta}^*$ there is a net sudden stop as the economy becomes insolvent:

$$\ell(\theta) = \tilde{\lambda}_1 + \tilde{\lambda}_2 Pr\left(x_i \leq \bar{x}^*(0) \middle| \theta = \bar{\theta}^*\right) = \bar{\theta}^* \tag{A.1}$$

Proof. Based on the definitions of $\bar{x}^*$ and $\bar{x}^{**}$, after some mathematical manipulations the function $\ell(\theta)$ can be rewritten as:

$$\ell(\theta) = \frac{1}{\Delta}\left[(1-\beta) + \kappa(1+\beta)\frac{1+r^f}{R(\theta)}\right]$$

with $\Delta = (1+\beta) + (1-\beta)\left[1 + \tilde{e}\left(1 - \frac{1+r^f}{R(\theta)}\right)\right]$.

$$\ell'(\theta) = -\frac{R'(\theta)}{R(\theta)^2}\left[\frac{1}{\Delta^2}\left((1-\beta)\tilde{e}(1+r^f)\right)\left((1-\beta) + \kappa(1+\beta)\frac{1+r^f}{R(\theta)}\right) + \frac{1}{\Delta}\kappa(1+\beta)(1+r^f)\right] < 0$$

This function is continuous and strictly decreasing $\forall\theta$. This is the case as $R(\theta)$ is continuous and monotonically increasing in θ. Consider the function $g(\theta) = \ell(\theta) - \theta$. Then $g(\theta)$ is decreasing. Without loss of generality, assume $R(0) = 1$.

$$g(0) = \frac{1}{(1+\beta) + (1-\beta)(1 - \tilde{e}r^f)}\left((1-\beta) + \kappa(1+\beta)(1+r^f)\right)$$

By imposing a very large limit on how much the exchange rate can depreciate: $\tilde{e} < \frac{2}{(1-\beta)r^f}$, we guarantee that $g(0) > 0$.

$$g(1) = \frac{1}{(1+\beta) + (1-\beta)(1+\tilde{e}\left(1 - \frac{1+r^f}{R(1)})\right)} \left((1-\beta) + \kappa(1+\beta)\frac{(1+r^f)}{R(1)}\right) - 1$$

We can show that $g(1) < 0$ as long as:

$$\kappa \frac{1+r^f}{R(1)} < 1 + \frac{1-\beta}{1+\beta}\tilde{e}\left(1 - \frac{1+r^f}{R(1)}\right)$$

which always holds since $1 + r^f < R(1)$ and $\kappa \in [0, 1)$. By the intermediate value theorem, there must exist some $\bar{\theta}^*$ such that $g(\bar{\theta}^*) = 0$ meaning that $\ell(\bar{\theta}^*) = \bar{\theta}^*$. For $\ell(\theta)$ continuous in the compact set $[0, 1]$, the solution is unique. □

A.2 Additional Equations

The model is additionally characterized by the thresholds: $\{\underline{\theta}^*, \underline{x}^*, \underline{\theta}^{**}\}$, which are determined by the solution to the following equations:

- *(Small d-investors)* After a foreigners' roll over, a d-investor i (receiving a signal x_i) solves: (i) the critical signal $x_i = \underline{x}^*$ defined by the following equation:

$$\underbrace{\underline{\pi}^*\left(R\left((1+\beta) + a\left(\underline{x}^{**}\right)\right) + (1+r^f)\left((1+\beta) - a\left(\underline{x}^{**}\right)\right)\right)}_{\text{Roll Over + Solvency}} + \underbrace{(1-\underline{\pi}^*))\left((1+r^f)\left((1+\beta) - a\left(\underline{x}^{**}\right)\right)\right)}_{\text{Roll Over + Insolvency}} = \underbrace{\left((1+r^f)\left(\kappa(1-\beta) + (1+\beta)\right)\right)}_{\text{Withdraw}} \tag{12}$$

  where $\underline{\pi}^* = Pr\left(\theta \geq \bar{\theta} | y \geq y^*; x_i = \underline{x}^*\right)$. And, (ii) the critical signal $x_i = \underline{x}^{**}$ defined by the following equation:

$$\underbrace{\underline{\pi}^{**}\left(R\left((1+\beta) + \tilde{e}(1-\beta)\right)\right)}_{\text{Roll over + Repatriation}} = \underbrace{\bar{\pi}^{**}\left(R(1+\beta) + (1+r^f)(1-\beta)\right) + (1-\bar{\pi}^{**})\left((1-\beta)(1+r^f)\right)}_{\text{Roll over + No Repatriation}} \tag{13}$$

  where $\underline{\pi}^{**} = Pr\left(\theta \geq \bar{\theta} | y \geq y^*; x_i = \underline{x}^{**}\right)$.

- *(Solvency).* Define $\underline{\pi}\left(\underline{x}^{**}\right) = (1+\beta) + (1-\beta)\left(1 + Pr\left(x_i \geq \underline{x}^{**} | \theta = \underline{\theta}^*\right)\right)$, and $\tilde{\lambda}_2 = \frac{1+\beta}{\underline{\pi}}$:

(i) There exists a threshold $\underline{\theta}^*$ determined by equation (14), such that for any realization of $\theta < \underline{\theta}^*$ there is a sudden stop as the economy becomes insolvent:

$$\ell(\theta) = \tilde{\lambda}_2 Pr\left(x_i \leq \underline{x}^*(0) \middle| \theta = \underline{\theta}^*\right) = \underline{\theta}^* \tag{14}$$

B Data Appendix

B.1 Construction of Capital Flows Series

In 2009 there was a methodological change in the construction of the Balance of Payments (BOP) statistics, from BPM5 to BPM6. The calculation of the series of direct investment were the most affected by this change. While BPM5 distinguishes between "Direct Investment Abroad" and "Direct Investment in Reporting Economy," BPM6 computes direct investment distinguishing between assets and liabilities. The IMF reports the BPM5 series up to 2008 and the BPM6 series from 2005.

Due to this methodological change, the subcomponents of the financial account of the BOP (direct investment, portfolio investment and other investment) are not comparable between BPM5 and BPM6, since BPM5 does not follow the asset-liability criterion for the calculation of direct investment. Despite not being able to use the subcomponents of the financial account prior to 2005, the total flows of capital – both inflows and outflows – can still be computed because BPM5 reports the aggregate series of asset and liability transactions.

The series of inflows and outflows are computed using the following series from the BOP statistics reported by the IMF:

- 1980 – 2004 (BPM5)
  - Assets: Total Asset Transactions
  - Assets excluding reserves: Total Asset Transactions - Reserve Assets
  - Liabilities: Total Liability Transactions
- 2005 – 2017 (BPM6)
  - Assets: Direct Investment, Assets + Portfolio Investment, Assets + Financial Derivatives, Assets + Other Investment, Assets + Reserve Assets

– Assets excluding reserves: Assets - Reserve Assets

– Liabilities: Direct Investment, Liabilities + Portfolio Investment, Liabilities + Financial Derivatives, Liabilities + Other Investment, Liabilities

The series of BPM5 and BPM6 are combined to generate assets and liabilities series for the full period. Based on them, capital outflows are computed as the negative of the assets excluding reserves, while the inflows correspond to the liabilities.

B.2 Defining Prevented Sudden Stops and Other Episodes

In Balance of Payments (BoP) accounting, gross inflows correspond to total liability transactions in the Financial Account (i.e., lending from non-residents). Gross inflows can be either positive (i.e., a capital inflow to the reporting economy) or negative (i.e., a flow of capital from the reporting country to the rest of the world). Gross outflows are the total asset transactions in the Financial Account (i.e., residents' purchases of foreign assets), excluding international reserves transactions.[23] A decrease in foreign asset holdings of residents leads to capital repatriation - which is an inflow to the reporting economy - and therefore it is recorded with a positive sign in the BoP (and vice-versa for an increase in foreign asset holdings of residents). As a result, *net flows* - which are the sum of inflows and outflows - can be either positive (i.e., net capital inflow to the reporting economy) or negative (i.e., net capital outflow from the reporting economy).

Raw data on capital flows are available at a quarterly frequency in the IMF's BOPS dataset. The sample consists of 112 countries including advanced economies and emerging markets, between 1980q1 through 2017q4.[24]

To reduce the effects of seasonality and the incidence of random fluctuations in quarterly net and gross capital flows series, we smooth the series according to the procedure in Forbes and Warnock (2012). First, the series are aggregated based on the following formula:

$$C_{t,j} = \sum_{t=0}^{3} X_{t-1,j}, \qquad j = 1, 2, 3 \quad and \quad t = 1, \ldots, T \tag{15}$$

[23] Broner et al. (2013) include "changes in reserves" in their definition of "gross capital outflows." When a central bank accumulates international reserves, it is in essence accumulating foreign assets. However, in the BoP convention - which we maintain in this paper - changes in reserve assets holdings by the central bank are distinguished from gross outflows, which are the changes in foreign assets holding of other residents.

[24] See Appendix B.1 for a description of the capital flows data and the treatment given to the data.

where $X_{t,1}$ = Inflows, $X_{t,2}$ = Outflows and $X_{t,3}$ = Net Flows.[25]

Next, the annual change in each of the series is defined as:

$$\Delta C_{t,j} = C_{t,j} - C_{t-4,j}, \qquad j = 1, 2, 3 \quad and \quad t = 5, \ldots, T. \tag{16}$$

[25] Normalizing the capital flows series in per capita terms as in Caballero (2016) is not required in this context because the level of flows in each country is used to identify county specific episodes.

C Additional Tables

Table 7: "Prevented" Sudden Stop Episodes

Country	*Start*	*End*	*Country*	*Start*	*End*	*Country*	*Start*	*End*
Australia	1998q1	1998q1	Greece	2006q2	2006q3	New Zealand	2005q3	2005q3
Australia	2001q4	2002q1	Guatemala	2008q4	2009q4	New Zealand	2012q1	2012q3
Australia	2009q1	2009q3	Iceland	1989q2	1990q1	Norway	1983q4	1983q4
Australia	2012q2	2012q3	India	2001q4	2002q3	Norway	1991q3	1991q4
Austria	1993q3	1993q3	Indonesia	2006q4	2007q1	Panama	2002q1	2002q4
Austria	2001q1	2002q1	Ireland	1994q4	1994q4	Panama	2008q4	2009q4
Bangladesh	2009q2	2009q4	Israel	2007q4	2009q2	Paraguay	2009q4	2009q4
Belarus	2008q4	2009q1	Italy	1993q1	1993q3	Philippines	2008q2	2009q1
Belgium	2006q1	2006q3	Italy	1995q1	1995q1	Poland	1991q4	1992q2
Belgium	2008q4	2009q4	Italy	2000q4	2002q3	Portugal	1983q4	1984q2
Bolivia	2004q4	2005q1	Italy	2007q4	2009q3	Portugal	1996q2	1996q3
Brazil	1995q1	1995q2	Japan	2008q3	2009q4	Portugal	2004q4	2005q2
Brazil	2002q3	2003q2	Jordan	2011q4	2012q3	Portugal	2008q3	2009q3
Brazil	2012q1	2013q1	Latvia	1998q3	1999q2	Romania	2011q1	2011q1
Canada	2008q4	2009q2	Lesotho	1989q3	1989q4	Singapore	1998q4	1998q4
Canada	2013q3	2014q1	Lithuania	2000q4	2001q3	Singapore	2008q3	2009q3
Chile	2000q2	2001q1	Lithuania	2012q4	2013q1	Spain	1994q2	1995q1
Chile	2013q4	2014q2	Luxembourg	2008q2	2009q2	Spain	2001q3	2002q2
Cyprus	2013q1	2013q4	Macedonia	2002q1	2002q2	Sri Lanka	1994q2	1994q3
Czech Republic	2006q2	2006q4	Macedonia	2002q4	2002q4	Sri Lanka	1995q4	1996q1
Czech Republic	2008q4	2009q4	Macedonia	2012q2	2012q2	Sri Lanka	1998q3	1999q1
Denmark	1986q4	1987q2	Macedonia	2013q4	2014q2	Sri Lanka	2013q3	2014q1
Denmark	1994q3	1995q1	Malta	2000q1	2000q3	Sweden	1996q4	1997q3
Denmark	2001q2	2002q2	Mauritius	2008q3	2009q2	Sweden	2001q1	2002q3
Denmark	2008q4	2009q4	Mauritius	2012q2	2014q2	Switzerland	2008q1	2009q1
Finland	2001q1	2001q4	Mexico	2009q1	2009q3	Thailand	2008q2	2009q1
Finland	2003q1	2003q3	Namibia	2002q4	2003q2	United Kingdom	1994q2	1994q4
Finland	2005q3	2005q3	Namibia	2008q1	2008q1	United Kingdom	1998q1	1998q4
Finland	2009q2	2009q3	Namibia	2010q2	2010q4	United Kingdom	2001q3	2002q4
Finland	2011q2	2011q2	Nepal	1986q4	1987q1	United Kingdom	2008q2	2009q3
France	2002q1	2002q3	Nepal	1990q2	1991q1	Uruguay	2013q4	2013q4
France	2011q4	2012q3	Nepal	1995q4	1996q1			
Germany	1994q2	1994q4	Nepal	2009q4	2010q1			
Germany	2001q1	2002q2	Netherlands	1991q1	1991q4			
Germany	2004q1	2004q2	Netherlands	2002q1	2002q1			
Germany	2008q3	2009q4	Netherlands	2008q3	2009q3			

Note: A *"prevented"* sudden stop in economy j during period t is an event in which a foreigners' sudden stop does not co-exist with a sudden stop in net capital flows.

Table 8: Description of Variables and Sources

Variable	*Definition*	*Source*
Sudden Stops		
Capital Flows	See Appendix B.1.	BOPS (BPM5 and BPM6), IMF.
Foreigners' Sudden Stops	Dummy that takes de value 1 if the year-on-year change in foreign capital *inflows* falls below two standard deviations from its historical mean. In terms of measuring its length in time, the sudden stop episode starts from the moment in which the series falls one standard deviation below its historical mean, but conditional on the fact that it will eventually cross the two-standard-deviations threshold. The episode ends when the series goes back to one standard deviation below the historical mean.	Constructed by authors.
Sudden Stop in Net Capital Flows	Dummy that takes de value 1 if the year-on-year change in foreign capital *net flows* falls below two standard deviations from its historical mean. In terms of measuring its length in time, the sudden stop episode starts from the moment in which the series falls one standard deviation below its historical mean, but conditional on the fact that it will eventually cross the two-standard-deviations threshold. The episode ends when the series goes back to one standard deviation below the historical mean.	Constructed by authors.
Terms of Trade	100*(Price of Exports / Price of Imports). **This variable is used to compute sudden stop episodes associated with bonanzas.**	
Domestic Factors		
Real GDP	Level of real GDP (annual, 2010 prices). **This variable is used to compute the impulse responses of Section 4.**	National Accounts Main Aggregate Database (U.N. Statistics Division).
GDP Growth	Year-on-year growth rate of real GDP (quarterly).	IFS.
Inflation	Year-on-year growth rate of CPI.	IFS. When note available, CPI inflation was obtained from local sources and from Datastream.
Current Account (CA)	Current account balance from the Balance of Payments (quarterly).	BOPS (both BPM5 and BPM6), IMF.

Continues in next page

Table 8 – continued from previous page

Variable	*Definition*	*Source*
Absorption of Tradable Goods (TA)	Imports plus tradable output domestically consumed minus exports. Tradable output domestically consumed is constructed as the share of tradable output multiplied by GDP. The share of tradable output is computed as the ratio of agriculture plus industrial output to total GDP. The obtained series are deflated using the implicit GDP deflator.	Imports, exports and GDP in local currency at current prices from IFS (National Accounts). Agriculture and industrial value added as percentage of GDP, at annual frequency, from WDI (World Bank). Implicit GDP deflator from IFS.
Trade Openness	Exports plus imports as percentage of GDP.	Exports, Imports and GDP in local currency at current prices from IFS (National Accounts).
Foreign Liabilities	*Emerging and Developing countries*: Bank foreign borrowing as a share of GDP. *Developed countries*: Banks' local asset positions in foreign currency (vis-à-vis the non-bank sector) as a share of GDP.	Bank foreign borrowing from IFS (line 26c). Banks' local asset positions in foreign currency from BIS. GDP in US dollars from WEO, IMF.
Financial Depth	Deposit money banks and other financial institutions claims on the private sector as a percentage of GDP.	Claims on the private sector from IFS (lines 22d and 42d). GDP in local currency at current prices from IFS.
Contagion	Dummy variable that takes the value of 1 if a country reports a sudden stop in t and there is at least one *top 10 trading partner* with a sudden stop in $t-1$.	Constructed by authors.
Institutions	Sum of the following components: rule of law, investment profile, government stability, bureaucracy quality, and corruption.	Political Risk Services Group.
Financial Openness	Index measuring a country's degree of capital account openness.	Chinn and Ito (2006)
Flex	Monthly fine classification (1-15) of countries according to their exchange rate regime. Flex is a dummy variable that takes the value 1 if the classification category corresponds to a flexible exchange rate regime, and zero otherwise.	Reinhart and Rogoff (2004), updated by Iltzezky et al. (2009).
IT	Dummy variable that takes the value 1 if the country adopted and Inflation Targeting regime, and zero otherwise.	Official country sources (central banks reports and statements).
External Factors		
Global Risk	US stock market volatility.	Bloom (2009). VXO index updated from CBOE website.
Global Liquidity Growth	Average of the year-on-year growth rate of M2 in the United States, M2 in the Eurozone, M2 in Japan and M4 in the UK.	IFS.
Global Interest Rates	Average rate on long-term government bonds in the United States, Euro area and Japan	IFS.
Global Growth	Year-on-year growth rate of World's real GDP.	IFS.

Table 9: Summary Statistics

VARIABLES	No. of observations	Mean	Standard Deviation	Min	Max	p25	p50	p75
GlobalConditions								
Risk (index)	11,625	20.26	7.44	10.32	50	14.1	18.6	24
Liquidity Growth (%)	11,455	6.85	25.48	-106.1	155.1	0.1	7.1	13.6
Growth (%)	11,625	3.43	1.54	-1.87	7.9	2.68	3.43	4.42
Interest Rates (%)	11,624	4.48	2.79	0.7	13.04	2.85	3.47	5.97
Domestic Factors								
Financial Openness (index)	10,616	56.62	36.62	0	100	16.57	47.49	100
Institutions (index)	9,066	58.4	11.96	11	85	51.33	59.5	68
Contagion (dummy var.)	11,530	0.49	0.5	0	1	0	0	1
Foreign Liabilities (% GDP)	9,529	18.62	81.28	0.08	1,069	1.93	4.76	11.5
CA/TA (%)	5,975	18.38	253.31	-517.91	2,393	-7.94	0.03	7.05
GDP Growth (%)	7,026	3.28	4.12	-26.49	54.38	1.32	3.23	5.23
Inflation (%)	11,126	9.1	23.07	-17.83	411.31	1.81	4.06	8.41
Trade Openness (% GDP)	7,051	86.07	57.75	13.05	463.78	51.98	71.27	104.12
Financial Depth (% GDP)	11,194	53.77	42.68	1.11	263.27	20.98	42.48	74.75
Flex (dummy var.)	10,701	0.31	0.46	0	1	0	0	1
IT (dummy var.)	11,737	0.18	0.38	0	1	0	0	0
IT×Flex (dummy var.)	10,701	0.13	0.34	0	1	0	0	0