Preventing Sudden Stops in Net Capital Flows*

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Abstract

This paper explores the determinants of prevented sudden stops in net capital flows, highlighting the crucial role of domestic investors in repatriating foreign-held assets during external financing shocks. Information asymmetries regarding local economic conditions, which favor domestic investors, play a pivotal role in explaining why the actions of resident investors can differ from those of foreign investors. The empirical implications of the model are tested employing a Heckman probit model to address potential selection bias. The analysis identifies key domestic and external factors that affect the likelihood of an external crisis triggered by foreign investors, and shows under which conditions it can be prevented from turning into a costly sudden stop in net flows when domestic investors neutralize the run from foreigners. Robust local macroeconomic institutions promoting low and stable inflation, coupled with strong growth prospects, significantly increase the probability of preventing sudden stops in net flows. Findings contribute to understanding financial stability through strategic domestic investor behavior amidst global financial volatility, as well as its requirements.

JEL Codes: F30; F32; F40

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1 Introduction

The genesis of "sudden stops" in net capital flows is an abrupt and unexpected cut-off in international credit, i.e., a sudden stop in *gross inflows*.[1] When foreign investors stop lending, debtor countries must adjust to a tighter external financing constraint. Yet, not everyone in a country that is borrowing from abroad is a debtor vis-à-vis the rest of the world. In open economies, part of national savings is used to purchase foreign assets through *gross outflows*. These foreign-held assets can later be repatriated. If 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 in a vulnerable country (henceforth "foreigners' sudden stop") does not result in a sudden stops in net flows that is manifested through a reversal of the outstanding current account balance, from deficit to surplus or to zero. A "prevented sudden stop" is thus a situation in which net capital flows do not enter into sudden stop mode after foreign lenders stop lending.

However, not all episodes with an abrupt reduction in gross inflows result in prevented sudden stops. This is so because "sudden stops" as an economic concept applies only when the affected country was borrowing on net from the rest of the world and therefore was *vulnerable* to a cutoff in foreign lending. In other words, the vulnerability arises if the country was running a current account deficit at the onset of the foreigners sudden stop.[2] This paper defines the unit of analysis (prevented sudden stops in net flows) from a pool of foreigners' sudden stops episodes that materialized in countries that were running a current account deficit in excess of 2 percent of GDP at the onset of the episode.

The notion of prevented sudden stops is different from "retrenchments" (see Forbes and Warnock (2012)). Retrenchments are defined as large variations in gross outflows (in the direction of capital repatriation) that may or may not coincide with periods of collapses in gross inflows. Retrenchments involve variations in gross outflows only, with possibly no repercussions on the financing of current account deficits. They are part of a broader phenomena of cyclical

[1] 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.

[2] For example, Edwards (2004) points out that historically there have been many sudden stops measured by significant variations in capital flows, unrelated to current account reversal episodes. He pointed to that stylized fact to highlight international reserves' role in avoiding abrupt current account adjustments.

gross flows fluctuations that is unrelated to crises. Several papers have documented a high negative correlation between gross inflows and gross outflows in the balance of payments at normal business cycle fluctuations, especially in advanced economies.[3] In fact, gross inflows and outflows increase during economic expansions and decrease during recessions, generating a degree of automatic offsetting between the two types of flows.[4] However, the negative correlation between the flows at normal business cycle fluctuations does not imply that "prevention", as defined in this paper, is the norm when the external borrowing constraint binds in countries that are running current account deficits. For example, during the global financial crisis of 2008/09 when the reduction in gross inflows from foreign investors affected many economies simultaneously, significant "retrenchments" of resident investors offset fall in inflows in some countries, but not in others IMF (2013). And, moreover, it stands to reason that if there was full and automatic offsetting between gross inflows and outflows all the time, there would not be sudden stops in net capital flows, which is also counterfactual.

This paper explores the conditions under which prevention is more likely to happen. Using a simple analytical framework, this paper highlights that prevention is an equilibrium outcome contingent upon informational asymmetries favoring domestic investors regarding their home economy's conditions. Specifically, prevention materializes when the underlying economic fundamentals are perceived as sufficiently robust. This perspective aligns with the framework of information asymmetry, where domestic investors possessing superior knowledge about their country's economic environment are better positioned to make informed decisions about investment strategies. As a result, in scenarios where the domestic economy exhibits strong fundamentals, informed local investors are likely to engage in actions that prevent sudden stops in net flows, thereby steering the economy toward a state of equilibrium.

Changes in the model's conditions can lead to two closely linked outcomes. Firstly, they can influence the incidence of the underlying shock, a foreigners' sudden stop. Secondly, these impacts can also influence the conditions for domestic agents to act in ways that help to prevent the sudden stop in net flows from materializing. Therefore, the ensuing empirical analysis considers that the incidence of a foreigners sudden stop is not only an outcome, but is also a factor that determined whether there may or may not be prevention.

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

[4]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.

Based on the insights from the model, the empirical determinants of prevention are explored employing a Heckman probit model to control for the potential selection bias. The empirical framework considers the idiosyncratic roles of domestic and external factors in determining prevented sudden stops in net capital flows. Results show that the probability to prevent sudden stops is higher when macroeconomic policies and institutions cement low inflation forecasts and strong growth prospects.

Why should countries care about preventing sudden stops? A sudden stop in net flows imposes an adjustment in the outstanding current account deficit of the affected economy. This adjustment typically entails costly output loss. On the contrary, if the sudden stop in net flows can be prevented, then the ensuing adjustment of the current account deficit is forgone and, therefore, the associated output losses are lower.[5] This basic insight is corroborated with event study approach that explores the macroeconomic consequences of prevented and not prevented sudden stops in net capital flows separately. While sudden stops in net capital flows are associated with statistically and economically significant average fall in GDP and its components (except exports), prevented sudden stops in net flows are not.

This paper is closely related to the literature focusing on the stabilizing role of domestic investors during sudden stops. Adler et al. (2016) use a Panel Vector Autoregressive model in a group of 38 emerging market economies and find that shocks in risk aversion (measured using the VIX) have a limited negative impact on net capital flows; on the contrary, a shock in the short-term interest rate of the US leads to a decline in net capital flows. Given that both shocks lead to a sizable decline in gross inflows, the authors argue that domestic investors might play a stabilizing role during episodes of global risk fluctuations but not necessarily during interest rate variations. Following suit, Agosin et al. (2019) disentangle the factors underlying three episodes: no sudden stops, a foreigners sudden stop but not a sudden stops in net flows, and a foreigners sudden stop that materialized in a sudden stop in net flows. The authors argue that asset availability plays a decisive role in mitigating the incidence of a sudden stop in net flows when there is one in capital inflows. Alberola et al. (2012) highlight the importance of international reserves so that there can be compensatory behavior on the part of domestic agents.

The theoretical underpinning is closely related to Caballero and Simsek (2020) and Jeanne and Sandri (2023). Those papers present frameworks where local investors provide a stabilizing counter-

[5]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.

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 to the return of domestic assets. We find that with uncertain returns, the offsetting behavior from domestic investors is not mechanic; instead it is contingent on the state of the underlying domestic fundamentals. Tille and van Wincoop (2014) present an overlapping generation model in which private information leads to the high correlation between capital inflows and outflows.

The results collectively point to the need to strengthen the economic factors that favor prevention in a world of volatile capital flows. While external factors determining the probability of crises may be outside the direct control of local authorities, sound domestic policies can help countries build resilience against the external shocks, increasing the chances that foreigners sudden stops could become a prevented sudden stop in net flows, rather than a costly and damaging sudden stop in net flows.

2 A Simple Model of Prevention

This paper presents a simple model of sudden stops in the context of global games with incomplete information, adding to the relevance of heterogeneous information to understand capital flows (e.g., Albuquerque et al. (2007, 2009); Tille and van Wincoop (2014); Iliopulos et al. (2021)). The model shows that prevention can emerge as an equilibrium outcome, even in scenarios of extreme external pressure, and rationalizes how factors that impact the likelihood of a foreigners sudden stop, subsequently condition the likelihood of prevention.

In the model, investors do not know the underlying state of the economy and rely on noisy private signals to make inference about the realization of that state, the likely actions of the others, and ultimately, the payoffs of their investment projects. We consider a situation where a mass of foreign investors behaves strategically, effectively acting as a single, large investor. In a scenario in which the foreign investor moves first withdrawing their investment position from a country, there is a range of economic fundamentals in which the optimal response of domestic investors is to counter the impact of the foreign investor's withdrawal.

The strategic interplay among investors allows investment projects to materialize in the face of reduced external funding availability, corresponding to the concept of a *prevented sudden stop.*

However, this outcome does not occur in isolation and is intertwined with the conditions that initially triggered the withdrawal by foreign investors. The sequential structure does not imply that the prevention problem is necessarily sequential, nor that the sequential nature of the actions built into the model's timing is what is driving the results. Instead, the sequential structure is useful to highlight how the actions of resident investors can help to offset the actions of foreign investors under the specific scenario of a foreigners sudden stop.[6]

Environment. Consider an economy with two investors. There is a continuum of investors acting as 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 stress the role of domestic investors in the limit scenario in which all foreign capital is withdrawn.

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. The d-investors hold $1+\beta$ in a domestic bond and $1-\beta$ in a safe foreign asset.[7] The parameter β reflects the relative size of both types of investors in the economy, and the availability of funds abroad. This parameter can also be interpreted as the size of the domestic market. 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 or roll over 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

[6] In a model in which both foreign and domestic investors react to signals and act simultaneously, the likelihood of a crisis is lower and prevention occurs even at much lower levels of fundamentals in the economy.

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

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.

Information. We introduce incomplete information to 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.[8]

Timing and Definitions. The f-investor moves first. Based on her signal, the f-investor decides whether to withdraw her domestic investment or roll it over. A *foreigners' sudden stop* is a situation in which the f-investor withdraws all her investment from the domestic economy. 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

[8]For example, Mondria et al. (2010), using AOL's released search/click-through histories of 657,426 anonymous users, concludes that investors are more attentive to news from more familiar countries. Cziraki et al. (2021) also find evidence that relative to non-locals, locals process more information about local assets.

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.

The assumption about the timing of decisions allows us to focus in the equilibrium scenario of domestic investors facing a foreigners' sudden stop. After observing the action of the f-investor, d-investors also decide whether to withdraw the domestic investments or roll them over. In case of capital flight, they recover $\frac{1}{\tilde{e}}\kappa(1+\beta)$ 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, $a = \{0, (1-\beta)\}$.

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, following 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.

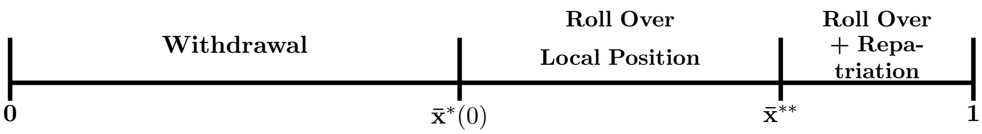
Definition 1. *In this sequential-move game a unique trigger equilibrium is characterized by a 7-tuple $\left(y^*, \underline{x}^*, \underline{x}^{**}, \bar{x}^{**}, \bar{x}^*, \underline{\theta}^*, \bar{\theta}^*\right)$. Such that: (i) the f-investor decides to roll over if her private signal y is 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 Equilibrium Thresholds

We focus in the equilibrium path resulting from the decision of the f-investor to withdraw their investment (a foreigners' sudden stop). The remaining equations associated with the alternative

[9] 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).

Figure 1: Domestic Investors Response



Notes: The figure presents the equilibrium cutoffs corresponding to the model in which the large foreign investor withdraw her position. The cutoff $\bar{x}^*(0)$ delimits the signal necessary for domestic investors to roll over their position.

equilibrium are presented in Appendix B. We present three propositions summarizing the optimal decisions of investors, and the determinacy of the solvency condition. All the proofs for these propositions are also found in the appendix.

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.

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:*

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

(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.

Figure 1 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.

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 that each investor has over the total portfolio in the domestic economy.

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

$$\ell(\theta) = \tilde{\lambda}_1 + \tilde{\lambda}_2 Pr\left(x_i \leq \bar{x}^*(0) \middle| \theta = \bar{\theta}^*\right) = \bar{\theta}^* \tag{3}$$

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. Originally, the size of the investment in the domestic economy was equal to two: $1-\beta$ units from f-investor and $1+\beta$ units from d-investors. However, in case of repatriation, d-investors increase their relative size in the economy by the factor $\tilde{e}(1-\beta)Pr\left(x_i \geq \bar{x}^{**}|\theta = \bar{\theta}\right)$, at the expense of the share from foreign investors.

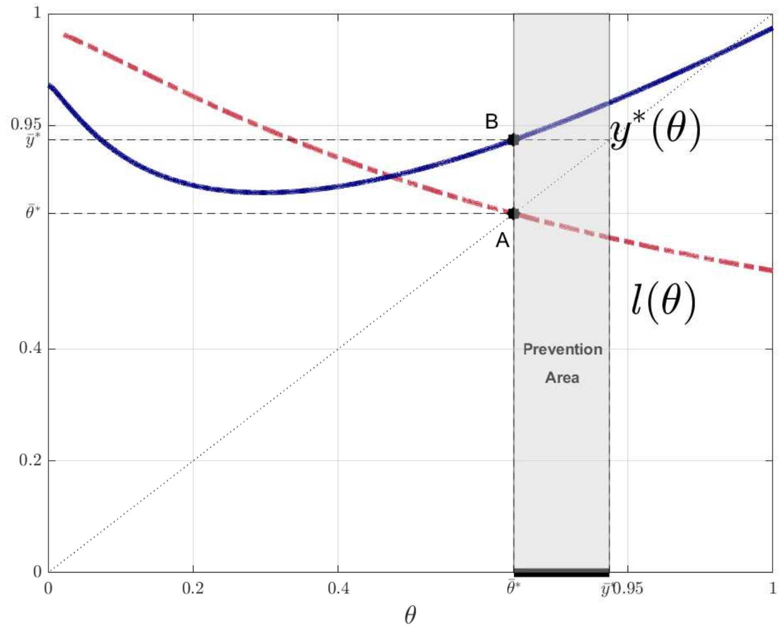
2.2 The Prevention Area

In this section, we explore how the equilibrium involves the existence of an area in the fundamentals space in which, despite a foreigners' sudden stop, the economy remains solvent, and investment projects materialize. We label this the prevention area. We define this zone and analyze how it shifts in response to changes in various parameters of the model.

2.2.1 Definition

Based on propositions 1-3, we can define an area along fundamentals where foreign investors withdraw their investment, but the economy remains solvent and investment projects materialize, that is the prevention area. Figure 2 depicts f-investor's equilibrium conditions and the solvency equation as a function of the fundamental θ. The dashed red line corresponds to $\ell(\theta)$ in equation (3), and the solid blue line corresponds to $y^*(\theta)$ -i.e., the threshold for a foreigners' sudden stop- in Proposition 1. These two functions suffice to characterize the equilibrium and define prevention

Figure 2: Prevented Sudden Stops



Note. The solvency cutoff, $\bar{\theta}^*$, which is the solution to equation 3, 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 $\bar{y}^*$.

area since the solvency condition embeds d-investors' decision to withdraw their investment or repatriate their foreign funds.

To determine the equilibrium thresholds in this game, first, we solve for the solvency cutoff $\bar{\theta}^*$, which is the solution to equation 3 and determined by the intersection of the $\ell(\theta)$ curve with the 45-degree line (point A). Next, we evaluate $y^*(\theta)$ at the equilibrium value $\bar{\theta}^*$ 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 along the fundamental space. The range $\left[0, \bar{\theta}^*\right]$ is the zone in which a sudden stop in net flows occurs. In this area, fundamentals are below the thresholds $y^*(\bar{\theta}^*)$, thus, there is a foreigners' sudden stop; in addition, the economy is insolvent as fundamentals are also below the cutoff $\bar{\theta}^*$. Thus, the sudden stop in net capital flows encompasses the withdrawal from the f-investor and the inability of d-investors to offset that effect, either by the withdrawal of their own investment, or because their rollover is not sufficient to compensate the withdrawal of f-investor.

The range $[\bar{\theta}^*, \bar{y}^*]$, which is depicted as the shaded grey area in Figure 2, corresponds to the prevented area. Prevention occurs as fundamentals are below $\bar{y}^*$, but the economy is solvent and investment project materializes as fundamentals are above $\bar{\theta}^*$. More formally, the range of prevention (r^*) corresponds to the area formed between the optimal cutoff for f-investors and the solvency condition, when this difference is positive ($r^* = \max\{0, \bar{y}^* - \bar{\theta}^*\}$).

When the area of prevention is positive, the model features a range of fundamentals in which an equilibrium with domestic investors counteracting the withdrawal from foreign investors can surge. This occurs in a scenario of significant external pressure, where foreign investors withdraw their investments and signal their decisions to domestic investors by moving first. Unsurprisingly, this equilibrium requires larger realizations of economic fundamentals. This is because the two mechanisms in place to increase the incidence of prevention, namely higher domestic rollover and repatriation of foreign assets, will only offset 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 to investors, it is positively associated with the strength of domestic fundamentals.

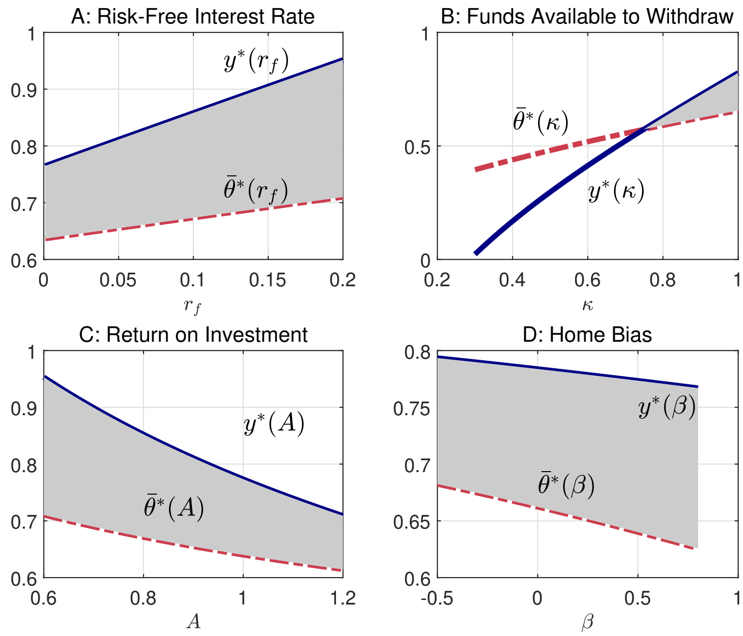
2.2.2 The Range of Prevention

This section examines how changes in the model parameters affect the prevention area. We analyze the evolution of prevention across four scenarios: changes in the risk-free rate (r_f), available funds to withdraw (κ), increases in the return of investment (A), and home bias (β). The results are graphically presented in the panels of Figure 3. The solid blue line represents the equilibrium thresholds $\{\bar{y}^*\}$, the dashed red line corresponds to the equilibrium thresholds for $\{\bar{\theta}^*\}$, and the grey shaded area represents the range of prevention in equilibrium at different parameter values.

In general, the size of the prevention area depends on how parameters directly impact the decisions of foreign investors to withdraw their investments and how solvency is achieved. Panel A in Figure 3 shows how optimal thresholds change with variations in the risk-free rate (r_f). As the risk-free rate increases, the prevention area becomes wider. However, it requires better realizations of fundamental factors to come into effect. This phenomenon is attributed to the heightened responsiveness of foreign investors' thresholds to interest rate variations, which make a foreigners' sudden stop more likely under higher risk-free rates.

Panel B in Figure 3 illustrates a scenario where prevention does not occur. When the fraction of funds available for withdrawal (κ) is low, there is no prevention in equilibrium, as the solvency requirements exceed the conditions for a foreigners sudden stop. However, as the fraction of funds

Figure 3: Range of Prevention Sensitivity



Notes. The solid blue line in figure presents the equilibrium thresholds $\{\bar{y}^*\}$, while the dashed red line corresponds to the equilibrium thresholds for $\{\bar{\theta}^*\}$. The shaded grey region corresponds to the prevention area. Panel A corresponds to equilibrium values to changes in the risk free rate (r_f). Panel B corresponds to equilibrium values to changes in the fraction of funds available for withdrawal (κ). Panel C corresponds to equilibrium values to changes in the investment return function for level of fundamental (A). Panel D corresponds to the equilibrium values to changes in home bias (β).

available for withdrawal increases, the prevention range expands and is positively correlated with κ. However, similar to the case with the risk-free interest rate, this outcome is only observed with larger possible realizations of economic fundamentals.

In Panel C, we investigate the impact of more productive investment projects on a given fundamental level θ. To achieve this, we introduce an augmenting factor A in the return function $R(\theta, \ell, A)$, such that $R_A > 0$ (indicating an increase in the return with respect to A). Notice that as A increases, the prevention area decreases. This seemingly counterintuitive result reflects the decline in the likelihood of a foreigners' sudden stop due to the higher profitability of the investment projects. Similarly, Panel D, explores the effects of an increase in domestic bias β. The prevention range expands as domestic investors increase their exposure to domestic bonds. Unlike previous scenarios, this expansion arises more from the sensitivity of the solvency condition rather than a significant reduction in the likelihood of a foreigners' sudden stop.

The bottom line is that the size of the prevention area is not linked to the level of supporting fundamentals in a linear way. Ultimately, changes in the prevention decision result from the interaction between how changes in model parameters directly affect foreigners' incentives to withdraw their investments and the existing mechanisms to maintain solvency. Indirect linkages through the solvency condition also affect equilibrium outcomes. In Appendix B.2, we present two illustrative cases that underscore this feature. Firstly, we consider a scenario where we eliminate the possibility of repatriation. Despite this change not directly affecting the curve $y^*(\theta)$, it significantly impacts the equilibrium y^*, consequently altering the range of prevention. Secondly, we examine scenarios with larger depreciation, resulting in a shift in the prevention range, despite $y^*(\theta)$ remaining unaffected.

In summary, in the model presented in this section, prevention emerges as an equilibrium outcome in response to external pressure: foreign investors withdraw all their investment positions and signal this action to domestic investors by moving first. The model also explains how various factors that directly or indirectly influence the likelihood of a foreigners sudden stop subsequently affect the likelihood of prevention. These elements are integral to both the definition of prevention episodes applied to capital flows and the econometric strategy proposed to analyze factors correlated with prevention episodes in the upcoming sections.

3 On the Empirics of Prevention

3.1 Definition and Methodology

In the previous section, the model introduced the concept of a "prevented sudden stop", where domestic investors step in to maintain investment projects when external financing halts. This section applies these concepts to the dynamics of gross and net capital flows to empirically define prevention.

The halt in external financing is associated with a sudden stop in gross capital inflows, which for concreteness we define as foreigners' sudden stop. On the other hand, the concept of prevention is linked to a shift in capital outflows from domestic investors that compensates for the reduction in inflows, thereby averting a sudden stop in net capital flows. While in the model, prevention allows investment projects to materialize, prevention, in this case, avoids the significant reduction in economic activity, investment, and asset prices that accompanies net sudden stops in capital flows as extensively discussed in the literature (e.g., Guidotti et al. (2004); Korinek and Mendoza (2014)).

From a balance-of-payments perspective, prevention helps avoid the need for a sudden, sharp adjustment in the current account deficit following a sudden stop in net flows. However, this concept is relevant only to countries that are vulnerable due to having a current account deficit and need financing.

Statistical vs. Economic Filters. Statistically, a foreigner's sudden stop is calculated using the methodology from Forbes and Warnock (2012). They define it as an event where the annual change in gross inflows drops at least two standard deviations below the mean. The duration of such an episode begins in the quarter when the series falls one standard deviation below the mean, provided it will eventually reach the two-standard-deviation threshold. The episode ends when the series returns to one standard deviation below the historical mean.

A sudden stop in net capital flows is similarly defined in the tradition of Calvo et al. (2008), using the same algorithm applied to net capital flows series. It is an event in which the annual change in net capital flows falls at least two standard deviations below the mean, with the beginning and end of the episode computed in an analogous way to the foreigners' sudden stop.

Given the definitions of a foreigner's sudden stop and a sudden stop in net capital flows, the purely statistical definition of a prevented sudden stop is the absence of a sudden stop in net capital flows in the aftermath of a foreigners' sudden stop. While this method is helpful for initial classification, it has two key limitations. First, the presence of a foreigners' sudden stop alongside a sudden stop in net capital flows in the data does not necessarily mean that a country must adjust to a tighter external financing constraint. This could be because the affected economy is running a current account surplus instead of a deficit, or it may have access to alternative external financing sources not recorded in the financial account of the balance of payments. Examples of these alternative sources include swap lines with central banks, access to IMF resources, or increased remittances.

Second, a reduction in the current account deficit may materialize even if there is no sudden stop in net flows following a foreigners' sudden stop. This phenomenon can be attributed to the ad-hoc selection of thresholds to define different cutoff values in the definitions of sudden stops. Concretely, while using two standard deviation thresholds is standard in the sudden stops literature, it is admittedly arbitrary. Are, for example, 1.9 or 1.8 standard deviations all that different? This becomes particularly relevant when comparing countries with different histories of capital flow volatility, or countries experiencing recurring events within a short time frame, where a two-standard deviation threshold may overstate or understate the true volatility.

To ensure that the definition of prevented sudden stops is empirically relevant and minimizes misclassifications we refined the statistical criterion of a two-standard deviation contraction in gross and net flows. Specifically, we define prevented sudden stops as occurring only in vulnerable countries, defined as those that at the beginning of a foreigners' sudden stop, had a current account deficit of at least two percent of GDP. We then classify an event as a prevented sudden stop if, after the onset of the foreigners' sudden stop, there is no sudden stop in net flows, and/or the current account deficit does not contract by more than one standard deviation, or one-third of the current account deficit.[10]

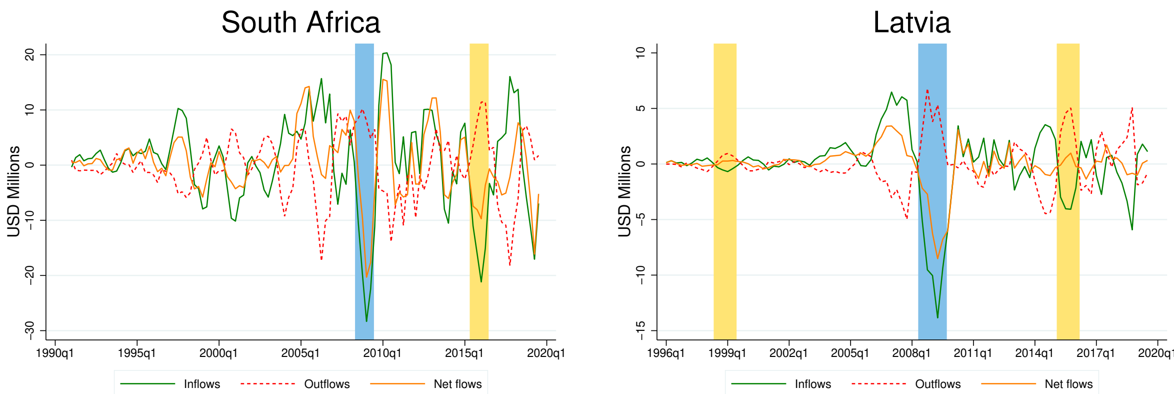
3.2 Data and Frequency of Episodes

How frequent are prevented sudden stops in the data? To answer this question, we build a balanced panel database that collects information on quarterly capital flows: net flows, gross outflows (excluding international reserves) and gross inflows for 60 countries with available information between 1980q1 through 2019q3 from the IMF BOPS dataset. We end the sample in 2019 to avoid the impacts of the COVID-19 pandemic. The choice of countries responds to data availability. We keep only countries with at least twenty years of capital flows observations and with sizable capital outflows. Given the observed volatility of gross capital inflows and outflows at the quarterly frequency, we use smoothed capital flows series –as described in appendix A.1– to compute the different episodes of interest.

We begin with the purely statistical definitions described in the previous section. Figure 4 illustrates the identification of episodes using the statistical algorithms for South Africa and Latvia. In the case of South Africa (panel A), the algorithms detect two foreigners' sudden stops episodes, marked by blue and yellow shading. These occur when the gross inflows series (green solid line) fall below two standard deviations from their moving average. The blue shading indicates that the 2008 episode was followed by a sudden stop in net capital flows. This happens when changes in gross outflows (red dashed lines) are insufficient to counter the decline in inflows, causing net flows (orange line) to fall below two standard deviations from their moving average. In contrast, the yellow shading represents prevented sudden stops, where significant increases in outflows (red dashed line) offset the decline in inflows (green solid line), keeping net flows (orange solid line)

[10]We also excluded from the definition those episodes in which the country experienced a sustained boom in the terms of trade, since it can by itself revert the trend in the current account without direct mediation of the capital flows.

Figure 4: Inflows, Outflows, and Net Flows
(Yearly variation of annualized flows)



Source. Author's own calculations based on data from IMF-BOPS. Blue-shaded areas are sudden stop in net flows. Yellow-shaded areas are prevented sudden stops episodes.

relatively stable. Panel B illustrates the case of Latvia, where two out of three episodes identified as foreigners sudden stops were prevented, as indicated by the yellow shading. In both cases, the figure shows that the increase in gross outflows was large enough to prevent sudden stops in net flows.

Applying the sudden stop algorithms on the entire panel dataset, we initially identify 227 episodes of foreigners' sudden stops. However, upon closer inspection, in 97 of these episodes, the affected countries did not exhibit current account vulnerability, meaning that either the current account deficit was less than 2 percent of GDP (39 episodes) or the country was running a current account balance or surplus (58 episodes). After filtering out these episodes, the remaining sample is 130 foreigners' sudden stops. Considering the variations in net capital flows and the current account balance after the onset of these episodes as explained in the previous section, we find that 87 of those episodes turned into sudden stops in net capital flows, while 43 episodes are classified as prevented sudden stops.

We then inspected the 43 prevented sudden stops and found that in 7 of them, there was a significant reduction in the current account deficit of at least one standard deviation, or one-third of the outstanding deficit. These are exemplified by the cases of Turkey and Guatemala, shown by the green shaded areas in Figure 5. In Turkey (2002) and Guatemala (2015), although net capital flows decreased following the foreigners sudden stop, the decline was slightly less than two standard deviations (indicated by the grey dashed line not crossing the -2 standard deviation line). Thus, the statistical algorithm initially classified these episodes, along with 5 other similar episodes, as prevented sudden stops. However, we reclassify them as sudden stops in net flows because in all of them there is a decline on the net capital flows (albeit less than 2 standard deviations) and a significant reduction in the current account deficit.

Therefore, after the reclassification, the final estimating sample consists of 94 episodes of sudden stops in net capital flows and 36 episodes of prevented sudden stops. These numbers underscore that prevention is not automatic. It occurs in only 27% of the identified foreigners' sudden stops episodes. Episodes that become prevented sudden stops are shorter, averaging 3.64 quarters compared to 4.37 quarters for those not prevented.

The 36 prevention episodes have taken place across 24 countries, with the majority (63%) in developing economies. This is not surprising because most foreigners' sudden stops in our sample also occur in developing countries. However, there is a mixture of experiences: 18 developing and 8 advanced economies have experienced both sudden stops in net flows and prevented sudden stops following foreigners' sudden stop episodes. The United Kingdom is the only country where all episodes were prevented.

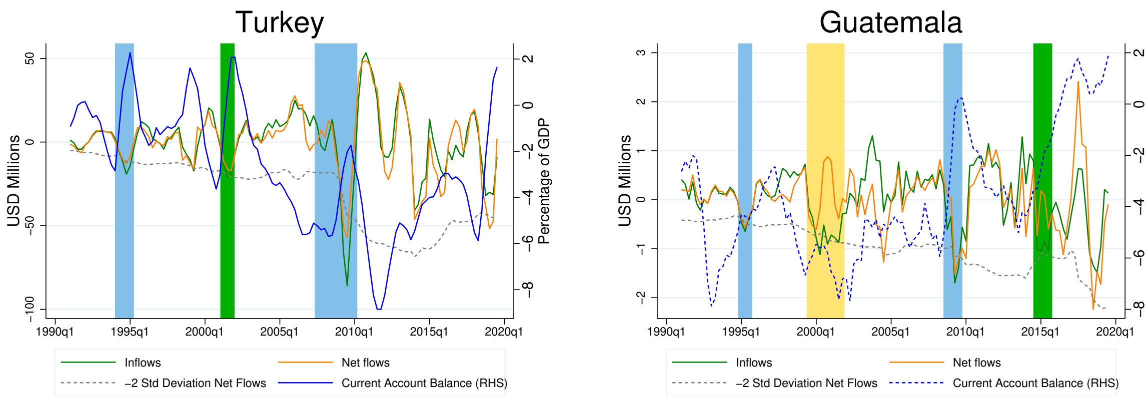
The proportion of prevented episodes has increased over the decades, as detailed in Appendix D. In the 1980s, 16% of foreigners' sudden stops were prevented (2 episodes). This increased to 25% in the 1990s (12 episodes), 30% in the 2000s (15 episodes), and 32% in the 2010s (7 episodes). This trend is partly due to a decrease in the overall number of foreigners' sudden stops in the last decade. While there were 12 sudden stops in the 1980s, this number surged to 47 and 49 in the 1990s and 2000s, respectively. In the 2010s, the number of foreigners sudden stops declined to 22, less than half the count observed in preceding decades.

3.3 Sector, Type, and Retrenchment Episodes

Due to the detailed nature of capital flows data, we can identify the main drivers behind fluctuations in capital outflows. Specifically, we can examine the role of international reserves during prevented episodes and how different types of flows, such as debt or equity outflows, determine prevented sudden stops. A specific flow is identified as the primary driver of an episode if it accounts for more than 50% of the total variation in capital outflows during the period analyzed. This does not imply it is the sole contributor but that its contribution is the most significant.

Public vs. Private Flows. This definition of prevented sudden stops focuses on private capital outflows, excluding international reserves. However, reserves can also play a significant role in preventing sudden stops. Columns 1-3 of Table 1 categorize episodes by comparing the sector with

Figure 5: Prevented Sudden Stops and Reversals
(Yearly variation of annualized flows)



Source. Author's own calculations based on data from IMF-BOPS. Blue-shaded areas are sudden stop in net flows. Yellow-shaded areas are prevented sudden stops episodes. Green-shaded areas are prevented sudden stops that coincides with a reversal of the current account.

the most significant change during a foreigners' sudden stop. In prevented episodes, fluctuations in international reserves are smaller compared to private capital outflows. In 80% (29 out of 36) of prevented episodes, the primary offsetting flow was private capital outflows from domestic residents. Conversely, in episodes resulting in a net sudden stop, 65% (62 out of 94) were characterized by private capital outflows as the predominant varying flow.

Debt vs. Equity Flows. We categorize capital flows into debt flows (including portfolio debt and other investments such as trade credits, loans, and currency/deposits) and equity flows (including portfolio equity and foreign direct investment). An episode is debt-led if the change in debt flows is larger than the change in equity flows (Forbes and Warnock (2014)). Columns (4) and (5) of Table 1 show that the most significant changes are due to fluctuations in debt flows, with prevention observed in 77% of cases involving substantial variations in debt flows. Overall, over 80% of all foreigners' sudden stops (prevented or not) were driven by significant variations in debt flows. Due to the limited number of equity episodes, we aggregate capital flows to maintain statistical power for subsequent sections. The findings are primarily influenced by changes in debt flows.

Prevention is NOT Retrenchment. A *retrenchment of capital outflows*, as defined by Forbes and Warnock (2012), is the opposite of a foreigners' sudden stop but applied to gross outflows: a significant shift where domestic investors repatriate foreign-held assets. We check if prevention, as defined in this paper, is directly linked to retrenchment and find that it is not. Retrenchment is neither necessary nor sufficient for prevention. A retrenchment episode can occur with or without

Table 1: Episodes by Sector, Type, and Retrenchment

	Sector			Type			Retrenchment		
	Private	Public	**Total**	Debt	Equity	**Total**	With	Without	**Total**
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
SSNF	62	32	94	82	12	94	33	61	94
Prevented	29	7	36	28	8	36	25	11	36
Total	91	39	130	110	20	130	58	72	130

Source. Author's calculations.

Note. SSNF=Sudden Stop in Net Flows. Prevented=Prevented Sudden Stop. Private flows correspond to capital outflows from domestic residents. Public flows correspond to international reserves.

a simultaneous foreigners' sudden stop and with or without a sudden stop in net capital flows. Columns 7-9 of Table 1 underscore this point. Retrenchment is not always necessary, as 30% (11 out of 36) of prevented episodes occurred without a significant variation in outflows to be classified as retrenchment. Additionally, 35% (33 out of 94) of episodes ending in a sudden stop in net flows coincided with retrenchment in capital outflows.

4 Determinants of Prevention

The theoretical results presented in Section 2 pose an empirical challenge in identifying the drivers of prevention. This challenge arises because the incidence of prevented sudden stops depends on foreign investors' decisions to withdraw their investments. Therefore, the empirical assessment of prevention determinants must consider how explanatory variables affect both the likelihood of prevention and the probability of a foreigners' sudden stop, creating a selection problem.

The selection problem exists because prevented sudden stop episodes cannot be isolated from the economic context in which they occur. Specifically, the imminence of a foreigners' sudden stop might influence how private capital outflows react. To address this issue, we introduce a traditional Probit model with sample selection, following the approach by Van de Ven and Van Praag (1981). We use international reserves as a share of imports as the selection variable.

We compare these results with the methodology developed by Cook et al. (2021), based on Altonji et al. (2005). This approach fixes the correlation between equations, allowing estimates to be made even when no instrument is determining the selection, and provides bounds on the true value of the coefficients.

Both methodologies involve maximizing the joint likelihood of two equations: the selection equation, which models the probability of a foreigner's sudden stop, and the outcome equation, which models the probability of prevention. While the selection equation has received more attention in the literature (Forbes and Warnock, 2012, 2021), the main contribution of this paper lies in its focus on the outcome equation. Specifically, we identify the relevance of external and internal factors in affecting the decision of prevention. Appendix tables 12 and 13 provide a detailed description of the dependent and explanatory variables definitions and data sources, and basic summary statistics, respectively.

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

- *Global risk* is proxied by US stock market volatility, measured by the VXO index (implied volatility index calculated by the Chicago Board Options Exchange) for the period 1986-2019, extended back to 1980 based on Bloom (2009).
- *Global liquidity growth* is quantified using the yearly growth rate of money supply, calculated as the average growth rate of M2 in the United States, Eurozone, and Japan, and the 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.
- *Global growth* corresponds to the year-on-year growth rate in world real GDP. The source for the last three variables is the International Financial Statistics (IFS) database from the IMF.

Regarding domestic variables, we focus on those that are pre-determined and available to investors at the time of the foreigners' sudden stop. These variables more accurately reflect the information available to a domestic investor to influence their decision during a sudden stop. The pre-determined variables are:

- *GDP growth forecast*, defined as the country's year-on-year real GDP growth rate forecasted one year prior in the World Economic Outlook.
- *Inflation forecast*, defined as the country's average price level forecast in the World Economic Outlook one year prior.

Table 2: Baseline Results: Determinants of Prevented Sudden Stops in Net Flows

	Probit	Heckman Probit		Fixed Selection Bias: Outcome Equation		
		FSS	Prevented	$\lambda = 0$	$\lambda = -0.5$	$\lambda = -0.99$
	(1)	(2)	(3)	(4)	(5)	(6)
Global growth	0.145*	-0.064***	0.110***	0.145*	0.154**	0.094***
	(0.077)	(0.017)	(0.020)	(0.077)	(0.067)	(0.024)
VXO	-0.011	0.020***	-0.020***	-0.011	-0.020**	-0.024***
	(0.010)	(0.003)	(0.004)	(0.010)	(0.009)	(0.004)
Money growth	-0.008	0.002	-0.005	-0.008	-0.008	-0.003
	(0.015)	(0.006)	(0.006)	(0.015)	(0.013)	(0.006)
Interest rate	-3.365	7.543***	-7.630***	-3.365	-4.498	-4.112**
	(3.582)	(1.352)	(1.681)	(3.578)	(3.395)	(1.907)
GDP growth forecast	0.077**	-0.096***	0.109***	0.077**	0.109***	0.109***
	(0.031)	(0.017)	(0.019)	(0.031)	(0.030)	(0.020)
Inflation forecast	-0.073***	-0.001	-0.011***	-0.073***	-0.064***	-0.015***
	(0.020)	(0.001)	(0.001)	(0.020)	(0.018)	(0.004)
Reserves/Imports		-0.016***				
		(0.003)				
Observations	413	5971		6758	6758	6758
Rho		-13.283***				
		(0.165)				
Wald Test		6461.06				
p-value		(0.000)				

Source. Authors' elaboration.
Notes. Standard errors are reported in parenthesis.*** (**) [*] denotes significance at the 1(5)[10] percent level. FSS=Foreigners'sudden stop which corresponds to the selection equation. Prevented corresponds to the outcome equation.

4.1 Baseline Results

The results are reported in Table 2. Following the approach of Eichengreen and Gupta (2018), we focus exclusively on the initial four quarters after the onset of a foreigners' sudden stop. All explanatory variables are lagged by one period, regardless of whether the data frequency is quarterly or yearly. To enhance the precision of this estimation, we include lagged variables from the onset for the entire duration of the episode, thereby excluding the use of explanatory variables concurrent with the ongoing episode.

Column (1) presents the results of a Probit model on the probability of prevention without considering selection; the sample contains only the 130 episodes of foreigners' sudden stops; the dependant variable is a dummy variable equal to one in the episode is a prevented sudden stop . In that specification, domestic variables play a significant role in the likelihood of preventing sudden stops. Specifically, better growth prospects increase the probability of prevention, while high inflation forecasts deters its probability. Instead, external factors are not statistically significant.

In columns (2) to (3), we present the results of a probit model with selection. In column (2) –the selection equation– the dependant variable is a dummy equal to 1 if there is a foreigners sudden stop, and zero otherwise. In column (3) –the outcome equation– the dependant variable is a dummy variable equal to 1 if there is a prevented sudden stop, and zero if there is a sudden stop in net flows. Reserves as a share of imports is the selection variable. We opt for imports rather than GDP as the normalizing variable in the denominator to reduce the impact of observed economic activity variables in the estimation process. This modeling choice assumes that international reserves influence the occurrence of foreigners' sudden stops but not prevented sudden stops. Theoretical support for this assumption stems from the potentially greater significance of reserve levels for external investors, who are more sensitive to currency risks. Empirical evidence in Davis et al. (2021) backs this assumption. These authors do not find reserves having a significant role in explaining net outflows although they show up as significant determinants of gross inflows. Similarly, our own estimations (see Appendix C and Table 7) do not indicate a statistically significant impact of reserves on the likelihood of prevention.

Results in columns (2) and (3) show that after accounting for selection bias, external factors emerge in the probability of prevention. When global growth is higher, volatility (VXO) is lower, and interest rates are lower, the probability of a foreigners' sudden stop decreases. And even for those crisis episodes that materialize, the likelihood of prevention increases. The results in relation to external factors differ from those of a single Probit model in column (1) without considering the selection problem. In terms of the domestic factors, sound economic prospects and lower inflation expectations reduce the probability of a foreigners sudden stop; and conditional on one happening nonetheless, sound domestic factors increase the probability of prevention. This potential impact of selection bias in identifying the determinants of prevention is also supported by the significance of the parameter Rho which is a measure of the correlation between the selection and outcome equations.

The previous results are supported under the assumption that reserves/imports is a valid instrument. While there is theoretical and empirical evidence supporting the assumption, it is not directly testable and may be invalid. To address this concern we adopt a methodology following Lee (2009) and Sartori (2003) that eliminates the need for an instrument in selection. Specifically, following Cook et al. (2021), the quantitative incidence of each variable in the baseline is bound at different degrees of the potential selection bias using midpoints and upper bounds of correlation values between unobservables (λ) in the selection and outcome equations. This is done setting λ to $\{0, -0.5, -0.99\}$

Columns (4) to (6) present the results for the outcome equation, where the dependant variable is equal to 1 if there is a prevented sudden stop, and zero if there is a sudden stop in net flows, when fixing the bias without employing an instrument.[11] Column (4) presents the results assuming the bias is nonexistent ($\lambda = 0$) to compare with the previous methodology. As expected, the results replicate those in column (1). However, with larger correlation values, the potential role that the bias generated in the estimation increases. Still, the results prove to be robust: once the potential bias is accounted for, a combination of external and domestic factors matter for the probability of foreigners' sudden stops and for prevented sudden stop. Columns (5) and (6) illustrate that regardless of the bias level, higher global growth and lower volatility increase the chance of prevention. The relevance of the interest rate is only significant when the correlation between selection and outcome is largest. Similarly, domestic factors influence the incidence of prevention at all potential bias levels.

4.2 Additional Controls

We augment the baseline model by sequentially introducing additional explanatory variables that can affect the probability of prevented sudden stops. For concreteness, we report the results for the outcome equation using two alternative values of fixed bias, as this approach mitigates convergence issues that the instrumental variable approach occasionally encounters. Table 3 presents the results for the outcome equation, while the selection equation is reported in the Appendix C in Table 9.

Panel A at the top of the table presents the results for a correlation between the outcome and selection equations of $\lambda = -0.5$, while Panel B at the bottom presents the results for $\lambda = -0.99$. These estimations allow us to identify the significance boundaries and the quantitative relevance of the indicators at different levels of bias correction. The results for GDP and inflation forecasts remain consistent across different model specifications, and global factors continue to significantly influence the likelihood of prevention.

Column (1) presents the results when adding a proxy of financial development. This variable captures the depth, access, and efficiency of financial institutions and markets, with an index first introduced in Sahay et al. (2015), which ranges from 0 to 1, where higher values indicate higher levels of development. Financial development, understood as the improvement of the functions within the financial system, is positively and significantly related to prevented episodes at several levels of bias correction, while the baseline results still hold. Quantitatively, its impact on the likelihood of prevention is the largest compared to other variables.

[11] The results for the selection equation with fixed selection bias are reported in Appendix C in Table 8.

Table 3: Fixed Selection Bias: Outcome Equation

	Panel A: $\lambda = -0.5$					
	(1)	(2)	(3)	(4)	(5)	(6)
Outcome equation: Prevented SS						
Global growth	0.130*	0.164**	0.107	0.152**	0.142**	0.123
	(0.070)	(0.073)	(0.070)	(0.068)	(0.069)	(0.075)
VXO	-0.019**	-0.023**	-0.029***	-0.019**	-0.019**	-0.028***
	(0.009)	(0.010)	(0.011)	(0.009)	(0.009)	(0.010)
Money growth	-0.007	-0.007	-0.010	-0.008	-0.007	-0.009
	(0.014)	(0.013)	(0.014)	(0.013)	(0.013)	(0.015)
Interest rate	-3.487	-3.720	-3.435	-3.936	-4.087	-2.506
	(3.443)	(3.560)	(3.532)	(3.553)	(3.386)	(3.906)
GDP forecast 1 year ago	0.157***	0.173***	0.126***	0.113***	0.114***	0.237***
	(0.032)	(0.033)	(0.032)	(0.031)	(0.030)	(0.037)
CPI forecast 1 year ago	-0.050***	-0.033***	-0.066***	-0.064***	-0.064***	-0.030***
	(0.016)	(0.012)	(0.017)	(0.018)	(0.019)	(0.011)
Financial development	1.322***					0.963**
	(0.302)					(0.377)
Financial openness		1.062***				1.113***
		(0.237)				(0.258)
Government stability			0.120***			0.094**
			(0.041)			(0.044)
Fiscal rule quality				0.136		-0.132
				(0.265)		(0.278)
Floating exchange rate					0.385*	0.061
					(0.197)	(0.252)
Constant	-0.125	-0.377	0.003	0.593	0.599	-1.583***
	(0.426)	(0.489)	(0.462)	(0.430)	(0.404)	(0.604)
	Panel B: $\lambda = -0.99$					
	(1)	(2)	(3)	(4)	(5)	(6)
Outcome equation: Prevented SS						
Global growth	0.084***	0.101***	0.064**	0.094***	0.092***	0.078***
	(0.025)	(0.025)	(0.028)	(0.024)	(0.024)	(0.029)
VXO	-0.023***	-0.024***	-0.023***	-0.022***	-0.023***	-0.020***
	(0.004)	(0.004)	(0.005)	(0.004)	(0.004)	(0.005)
Money growth	-0.002	-0.003	-0.008	-0.003	-0.003	-0.010
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Interest rate	-2.768	-3.924*	-4.195**	-2.348	-3.887**	-1.443
	(1.948)	(2.003)	(1.988)	(1.992)	(1.935)	(2.288)
GDP forecast 1 year ago	0.155***	0.151***	0.131***	0.118***	0.111***	0.204***
	(0.021)	(0.021)	(0.022)	(0.020)	(0.020)	(0.023)
CPI forecast 1 year ago	-0.008*	-0.007**	-0.017***	-0.015***	-0.015***	-0.004
	(0.004)	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)
Financial development	1.110***					1.023***
	(0.138)					(0.182)
Financial openness		0.506***				0.365***
		(0.094)				(0.117)
Government stability			0.032*			0.010
			(0.017)			(0.019)
Fiscal rule quality				0.437***		0.243*
				(0.118)		(0.138)
Floating exchange rate					0.167	-0.109
					(0.105)	(0.125)
Constant	1.115***	1.302***	1.640***	1.616***	1.786***	0.578***
	(0.183)	(0.193)	(0.180)	(0.168)	(0.162)	(0.217)
Observations	6758	6490	6336	6758	6758	6239

* p<0.1, ** p<0.05, *** p<0.01

Source: Authors' elaboration.Notes: Standard errors are reported in parenthesis.*** (**) [*] denotes significance at the 1 (5) [10] percent level.

Column (2) presents the results for financial openness, represented by the index developed by Chinn and Ito (2006). This index indicates a country's degree of financial openness on a scale from 0 to 1, where a higher value signifies greater openness of the financial system to international capital movements. As capital flows move freely, the probability of prevention rises, although the ultimate impact decreases as the bias size grows. Similar to the prior scenario, the results in the baseline remain unchanged, albeit with minor changes in the magnitudes.

We test the importance of institutional quality in the likelihood of prevention. In column (3), we report the results for a measure government stability. This dimension is captured by an indicator from the Political Risk Services Group (PRSG), evaluating the government's capacity to execute its stated programs and maintain office. Greater government stability positively impacts the probability of prevention; however, the significance of this variable is not stable across the entire regression spectrum, and in the presence of high bias values, the significance tends to diminish.

Column (4) represents the quality of fiscal institutions, measured by a variable that assesses the quality of fiscal rules in a country and developed by the IMF. This variable ranges from 0 for countries without such rules to 1 for the highest-quality rules, taking into account factors like legal foundation, institutional scope, enforcement mechanisms, and adaptability to shocks. In Panel A, this variable does not appear to influence the incidence of prevention; however, in Panel B, the significance increases, indicating that the incidence of this dimension is not robust but highly dependent on the size of the bias.

In column (5), we examine the impact of exchange rate flexibility on prevention. This variable is represented by a dummy variable based on the exchange rate regime classification of Reinhart and Rogoff (2004), where a value of 1 indicates a free-floating exchange rate. Relative to other exchange rate arrangements, flexibility does not seem to impact considerably the incidence of prevention.

Finally, since many of the dimensions introduced in this section are closely related and can capture common factors, we present in column (6) the results including all variables together. The baseline remains effective, with the caveat that global growth is only impacted when the bias implies larger correlations between equations. Domestic growth prospects and inflation remain highly significant. Among the new variables, financial development and financial openness seem to play an important role in prevention, not only due to their statistical significance but also because of their magnitudes. These two dimensions appear to encompass aspects of government stability and the quality of fiscal institutions, as the significance of these variables diminishes when all variables are included.

In summary, several domestic and external factors consistently influence the likelihood of prevention. Greater financial openness, financial stability, and higher GDP forecasts have a positive impact on the probability of prevention. Conversely, a more volatile global context and higher inflation forecasts have a negative impact on this likelihood.

4.3 Capital Controls

The positive impact of financial openness, as measured by the index developed by Chinn and Ito (2006), underscores the importance of capital openness in preventing sudden stops. However, the index alone does not provide comprehensive insights into the specific policies implemented by countries before facing foreigners' sudden stops. To address this gap, we utilize the detailed data from Fernandez et al. (2016) to examine whether prevention may result from restrictions on domestic investors' ability to mobilize their resources freely.

Table 4 presents the changes in capital control policies during the year preceding a foreigners' sudden stop. As in the previous sections, we present the results for correlations between the outcome and selection equations with $\lambda = -0.5$ in Panel A and $\lambda = -0.99$ in Panel B. Columns (1) to (3) report the baseline results, while columns (4) to (6) include additional controls.

A consistent finding across all specifications is that countries implementing some form of capital control during the year before the foreigners' sudden stop are less likely to prevent a sudden stop in net flows. This result is statistically significant across various specifications and controls. Additionally, this outcome is independent of whether the controls pertain to inflows or outflows suggesting that there is a symmetry in the response from investors to capital controls probably due to the fact that resident investors may not want to repatriate funds, even if there are not capital controls on inflows, if they can not eventually take their money out due to capital controls on outflows.

In summary, the implementation of capital controls, regardless of their focus on inflows or outflows, consistently reduces the likelihood of preventing sudden stops. This finding is robust across different model specifications and control variables, indicating the critical role of maintaining capital mobility in mitigating the risks associated with sudden stops.

Table 4: Fixed Selection Bias: Outcome Equation (Capital Controls)

	Panel A: $\lambda = -0.5$					
	(1)	(2)	(3)	(4)	(5)	(6)
Outcome equation: Prevented SS						
Global growth	0.271***	0.322***	0.232**	0.251**	0.302***	0.213*
	(0.102)	(0.103)	(0.101)	(0.117)	(0.116)	(0.114)
VXO	-0.018	-0.014	-0.020	-0.026	-0.024	-0.026
	(0.014)	(0.014)	(0.014)	(0.017)	(0.017)	(0.017)
Money growth	-0.027	-0.024	-0.029	-0.036*	-0.032*	-0.036*
	(0.018)	(0.018)	(0.018)	(0.019)	(0.019)	(0.019)
Interest rate	6.243	3.851	7.164	-0.747	-5.239	0.753
	(7.933)	(8.001)	(7.917)	(8.263)	(8.498)	(8.300)
GDP forecast 1 year ago	0.170***	0.188***	0.148***	0.165***	0.192***	0.141***
	(0.041)	(0.041)	(0.040)	(0.045)	(0.046)	(0.044)
CPI forecast 1 year ago	-0.053***	-0.052**	-0.059***	-0.059***	-0.055***	-0.066***
	(0.020)	(0.021)	(0.020)	(0.018)	(0.018)	(0.018)
Capital control	-1.346***			-1.265***		
	(0.291)			(0.301)		
Capital control: Inflows		-1.696***			-1.779***	
		(0.331)			(0.337)	
Capital control: Outflows			-0.906***			-0.756***
			(0.247)			(0.262)
Financial development				0.368	0.428	0.406
				(0.444)	(0.452)	(0.443)
Government stability				0.270***	0.301***	0.256***
				(0.056)	(0.058)	(0.055)
Fiscal rule quality				0.649**	0.672**	0.643**
				(0.300)	(0.301)	(0.299)
Floating exchange rate				0.330	0.248	0.351
				(0.285)	(0.284)	(0.278)
Constant	0.329	0.156	0.409	-1.761***	-2.089***	-1.663**
	(0.515)	(0.510)	(0.507)	(0.675)	(0.673)	(0.666)
	Panel B: $\lambda = -0.99$					
	(1)	(2)	(3)	(4)	(5)	(6)
Outcome equation: Prevented SS						
Global growth	0.155***	0.174***	0.142***	0.151***	0.174***	0.134***
	(0.047)	(0.047)	(0.046)	(0.050)	(0.050)	(0.048)
VXO	-0.020***	-0.019***	-0.021***	-0.016*	-0.014*	-0.017**
	(0.007)	(0.008)	(0.007)	(0.008)	(0.008)	(0.008)
Money growth	-0.012*	-0.011	-0.012*	-0.019***	-0.019**	-0.018**
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Interest rate	-3.712	-3.944	-3.474	-5.201	-6.812	-4.410
	(4.374)	(4.405)	(4.335)	(4.682)	(4.938)	(4.658)
GDP forecast 1 year ago	0.170***	0.183***	0.156***	0.198***	0.212***	0.184***
	(0.026)	(0.026)	(0.025)	(0.028)	(0.028)	(0.028)
CPI forecast 1 year ago	-0.020***	-0.019***	-0.023***	-0.019***	-0.018**	-0.021***
	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)	(0.007)
Capital control	-0.689***			-0.655***		
	(0.121)			(0.140)		
Capital control: Inflows		-0.871***			-0.888***	
		(0.137)			(0.153)	
Capital control: Outflows			-0.466***			-0.396***
			(0.101)			(0.117)
Financial development				0.681***	0.703***	0.718***
				(0.217)	(0.225)	(0.210)
Government stability				0.090***	0.104***	0.082***
				(0.026)	(0.027)	(0.025)
Fiscal rule quality				0.440***	0.451***	0.444***
				(0.153)	(0.157)	(0.149)
Floating exchange rate				0.014	-0.013	0.004
				(0.147)	(0.148)	(0.145)
Constant	1.720***	1.649***	1.745***	0.446	0.282	0.510*
	(0.213)	(0.210)	(0.211)	(0.287)	(0.291)	(0.277)
Observations	6758	6490	6336	6758	6758	6239

* p<0.1, ** p<0.05, *** p<0.01

Source: Authors' elaboration.Notes: Standard errors are reported in parenthesis.*** (**) [*] denotes significance at the 1 (5) [10] percent level.

5 The Costs Sudden Stops vs. Prevention

Sudden stops in net capital flows impose larger output losses on affected economies (Korinek and Mendoza, 2014; Cavallo et al., 2015). A reduction in the incidence of these episodes can generate real gains in economic activity. We estimate the short- and medium-term economic effects of the different episodes using an event study methodology, following Cavallo et al. (2022) to assess quantitatively the gains in output stemming from prevention.

The first step consists of comparing the evolution of key macroeconomic variables 3 years before and 3 years after the onset of prevented sudden stop and sudden stop in net flows episodes, respectively. To do so, we pool together the 36 prevented sudden stop and the 94 sudden stops in net capital flows. To pool together episodes that occur in different countries at different points in time, we align the onset of each episode at $T = 0$ and index all variables of interest to be equal to 100 at $T = 0$. Take, for example, real GDP. We set real GDP for each of the 94 sudden stops in net flows and separately, for the 36 prevented sudden stops to 100 at $T = 0$, and then trace the evolution of real GDP for each one using country-specific data up to three years before and three years after $T = 0$. In addition to real GDP, we employ the same procedure to study the evolution of the main components: real investment, real consumption, real exports, and real imports. In each case, we transform the variables into indices and employ the same procedure.

After pooling the episodes we run the following regression:

$$y_{i,s} = \beta_0 + \beta_1 \cdot \text{prev}_{ss} + \beta_2 \cdot s + \beta_3 \cdot \text{after}_T + \beta_4 \cdot \text{prev}_{ss} \cdot s + \beta_5 \cdot \text{prev}_{ss} \cdot s \cdot \text{after}_T + \beta_6 \cdot \text{after}_T \cdot s + \theta_{i,s}$$

where: $y_{i,s}$ is the outcome variable for country i at time s. β_0 represents the intercept of the model. prev_{ss} is a binary indicator variable that takes the value 1 for a prevented sudden stop and 0 for an actual sudden stop in net flows, with its effect on $y_{i,s}$ captured by β_1. s is a time index running from -3 to 3, centered at $T = 0$ (the time of the event), with β_2 representing the slope of the time trend. after_T is a binary indicator variable that equals 1 for all time periods from $T = 0$ onwards and 0 before that, with β_3 estimating the post-event impact on $y_{i,s}$. β_4 corresponds to the interaction between prev_{ss} and s, allowing the effect of prevented sudden stops to vary over time. β_5 measures the effect of the interaction among prev_{ss}, s, and after_T, facilitating the assessment of how the medium-term impacts of prevented sudden stops evolve following the event. β_6 captures the interaction between after_T and s, reflecting the change in the trend following the event for actual sudden stops. $\theta_{i,s}$ is the error term for country i at time s, encompassing all unobserved influences on the outcome.

The regression framework delineates the methodology for calculating the short-term and medium-term effects of two distinct types of prevented sudden stops and sudden stops in net flows. The coefficients obtained from the regression analysis are instrumental in this computation.

Short-term effects:

- For a prevented sudden stop ($\text{prev}_{ss} = 1$), the short-term effect captures the average immediate impact of the 36 episodes at $T = 0$. It is computed as 100 (normalization) minus the predicted value of the regression evaluated at $T = 0$. This is given by sum of the intercept (β_0), the product of β_1 and prev_{ss} and the terms (β_2) and the interaction term ($\beta_4 \cdot \text{prev}_{ss} \cdot s$) are evaluated at $T = 0$ to incorporate the period-specific impact.

- For sudden stops in net flows ($\text{prev}_{ss} = 0$), the short-term effect captures the average immediate impact of the 94 episodes at $T = 0$. The estimated effect is derived from the intercept (β_0) and the time trend (β_2) considered at $T = 0$. Specifically, the effect is computed as 100 (normalization) minus (β_0) and (β_2) considered at $T = 0$. In this case, the event-specific coefficients (β_1 and β_4) do not apply because $\text{prev}_{ss} = 0$.

Medium-term effects:

- For prevented sudden stop, the medium-term impact is the assessment of how the short term effect evolves in the periods following the onset of the event. It is calculated using the coefficient estimate of the three-way interaction term ($\beta_5 \cdot \text{prev}_{ss} \cdot s \cdot \text{after}_T$).

- For sudden stops in net flows, the medium-term effect is determined by the interaction term ($\beta_6 \cdot \text{after}_T \cdot s$), reflecting how the trend changes post-event.

In both cases, the values for the time index s and the binary indicators prev_{ss} and after_T are essential for the specific calculations at various time intervals.

Table 5 shows a summary of the results. For each variable, there is a set of estimates for the sudden stops in net flows and the prevented sudden stops. The result are expressed in percent. The last two rows include the p-value of the test of whether these estimates are statistically different. In the case of real GDP, we find a significant decline of 2.9% in the short term for the sudden stops in net flows. We find no statistically significant short term effect in the case of prevented sudden

Table 5: Effect of Prevented sudden stops and Sudden Stop in Net Flows over GDP and its Components

(Percentage)

	GDP		Investment		Consumption		Exports		Imports	
	Prevented SS	SS in net flows	Prevented SS	SS in net flows	Prevented SS	SS in net flows	Prevented SS	SS in net flows	Prevented SS	SS in net flows
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Short-Term Effect	0.20	-2.94**	1.79	-22.31***	0.53	-2.34**	-2.08	-1.56	0.52	-12.42***
Standard Error	(1.22)	(1.27)	(4.70)	(4.85)	(0.97)	(1.24)	(2.40)	(1.96)	(2.75)	(3.23)
Medium Term Effect	0.48	0.05	9.41	6.23	0.51	0.24	0.50	1.18	2.61	1.77
Standard Error	(0.74)	(0.78)	(7.10)	(6.85)	(0.72)	(0.79)	(1.36)	(1.30)	(2.01)	(2.13)
Observations	632		632		632		632		632	
p-Value Short Term	0.070		0.001		0.063		0.864		0.002	
p-Value Medium Term	0.446		0.113		0.595		0.487		0.530	

Source: Authors' elaboration. Notes: Standard errors are reported in parenthesis.*** (**) [*] denotes significance at the 1 (5) [10] percent level.

stops. The difference between the short term estimates for prevented (Column 1) and for sudden stops in net flows (Column 2) is statistically significant at 10% (row p-value short-term). There are no medium-term effects for real GDP in neither set of episodes. The GDP results are similar across all the components of real GDP (Columns 3-10), with the only exception of real exports (Columns 7 and 8) in which case the results are not statistically significant. Importantly, the results also suggest that the lost on economic activity associated with the sudden stop in net flows in the short term is not recovered in the medium term. This means that the estimated negative effects of sudden stops in net capital flows are persistent.

Why would prevented sudden stops be less costly to affected economies than sudden stops in net capital flows? The answer lies in the mechanisms at play. Table 10 shows the results from the same event study exercise applied to the stock of real credit to the private sector and the real bilateral exchange rate. In the short term, sudden stops in net capital flows are associated with a significant contraction in credit (-9.5%) and real exchange rate depreciation (-6.7%), which are larger than those for prevented sudden stops. For credit, the p-value for the short-term effect indicates that the difference between sudden stops in net flows and prevented sudden stops is statistically significant. In both cases, similar to the components of GDP, there are no statistically significant medium-term effects, suggesting that short-term losses are not recovered.

In conclusion, the concept of "prevention" mitigates the detrimental effects on output caused by sudden stops in net flows. It reduces the adverse impacts on GDP and its components following a foreigners' sudden stop that escalates into a sudden stop in net flows. This highlights the importance of exploring strategies to enhance countries' resilience against external shocks. Investigating effective preventive strategies is crucial for safeguarding against the volatility of global financial markets.

Table 6: Effect of Prevented Sudden Stops and Sudden Stop in Net Flows over Credit and Real Exchange Rate

(Percentage)

	Real Private Credit		**Real Exchange Rate**	
	Prevented SS	SS in net flows	Prevented SS	SS in net flows
	(1)	(2)	(3)	(4)
Short-Term Effect	2.8	-9.5*	-2.2	-6.7**
Standard Error	(5.3)	(5.4)	(2.2)	(3.1)
Medium Term Effect	1.3	-0.2	0.1	0.0
Standard Error	(3.7)	(3.7)	(1.4)	(1.6)
Observations	462		736	
p-Value Short Term	0.096		0.216	
p-Value Medium Term	0.560		0.920	

Source: Authors' elaboration. Notes: Standard errors are reported in parenthesis.*** (**) [*] denotes significance at the 1 (5) [10] percent level.

6 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 capital inflows to turn 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 "domestic factors" meaning factors that are amenable to policy interventions such as having a strong institutional framework, keeping inflation in check, having credible policy regimes that support the growth outlook, help to increase resilience to external financing shocks.

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 been analyzed yet. Results show that while it may not be possible for countries to insulate 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 adjustments. It is only under favorable domestic conditions that local investors may want to roll over domestic investments, or repatriate foreign asset holdings, at the time when foreigners' stop lending, thereby helping to prevent a sudden stop in net capital flows.

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A Data Appendix

A.1 Defining Prevented Sudden Stops and Other Episodes

Raw data on capital flows is available at a quarterly frequency in the IMF's BOPS dataset. The sample consists of 60 countries including advanced economies and emerging markets, between 1980q1 through 2019q3. We have kept only the countries with at least twenty years of quarterly capital flows observations.

Foreigners' sudden stops, retrenchment, and surges are calculated following Forbes and Warnock (2012). First, we compute the 4-quarter moving sum of inflows, outflows, and net flows series, as follows:

$$C_{t,j} = \sum_{t=0}^{3} X_{t-1,j}, \qquad j = 1,2,3 \quad and \quad t = 1,\ldots,T \tag{4}$$

where $X_{t,1}$ = Inflows, $X_{t,2}$ = Outflows and $X_{t,3}$ = Net Flows.[12] Second, for this newly created series, we compute the annual year-over-year change, defined as:

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

Third, we compute rolling means and standard deviations for $\Delta C_{t,j}$ in a window of 5 years.

[12] 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.

B Extended Model Version

B.1 Intuitions and Proofs

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:*

$$\begin{aligned} u(1,\bar{\theta}^*,\theta) &= (1+r^f)\left[\kappa(1-\beta)+(1+\beta)\right] \\ u(0,\bar{\theta}^*,\theta) &= \begin{cases} R(1-\beta)+(1+r^f)(1+\beta) & \text{if} \quad \theta > \bar{\theta}^* \\ (1+r^f)(1+\beta) & \text{if} \quad \theta \leq \bar{\theta}^* \end{cases} \end{aligned} \tag{6}$$

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

$$Pr\left(\theta \geq \bar{\theta}^*|y=y^*\right)u\left(0,\bar{\theta},\theta \geq \bar{\theta}^*\right)+Pr(\theta \leq \bar{\theta}^*|y=y^*)u\left(0,\bar{\theta},\theta \leq \bar{\theta}^*\right)=u(1,\bar{\theta}^*,\theta) \tag{7}$$

From equation 6, 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 (7) 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).

Proof. After some mathematical manipulation, equation 7 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 (`erfinv`), for any given θ. Notice that $\mathbf{\Phi}^{-1}(x) = \sqrt{2}\,\texttt{erfinv}(2x-1)$, thus:

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

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. □

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:*

$$
\begin{aligned}
u(1,a,\bar{\theta}^*,\theta) &= \tilde{e}(1+r^f)\left[\frac{1}{\tilde{e}}\kappa(1+\beta)+(1-\beta)\right] \\
u(0,a,\bar{\theta}^*,\theta) &= \begin{cases} R\left[(1+\beta)+\tilde{e}a\left(\bar{x}^{**}\right)\right]+\tilde{e}(1+r^f)\left[(1-\beta)-a\left(\bar{x}^{**}\right)\right] & \text{if} \quad \theta > \bar{\theta}^* \\ \tilde{e}(1+r^f)\left[(1-\beta)-a\left(\bar{x}^{**}\right)\right] & \text{if} \quad \theta \leq \bar{\theta}^* \end{cases}
\end{aligned}
\tag{8}
$$

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:*

$$\bar{\pi}^* u\left(0,a,\bar{\theta},\theta \geq \bar{\theta}^*\right) + (1-\bar{\pi}^*)u\left(0,a,\bar{\theta},\theta \leq \bar{\theta}^*\right) = u(1,a,\bar{\theta}^*,\theta) \tag{9}$$

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

$$\bar{\pi}^{**} u\left(0,1-\beta,\bar{\theta}^*,\theta > \bar{\theta}^*\right) = \bar{\pi}^{**} u\left(0,0,\bar{\theta}^*,\theta > \bar{\theta}^*\right) + (1-\bar{\pi}^{**})u\left(0,0,\bar{\theta}^*,\theta \leq \bar{\theta}^*\right) \tag{10}$$

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 (9) 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 of repatriation $a(x^{**})$, because it affects the portfolio balance and the expected returns on domestic and foreign investments.

Second, d-investors decide whether to repatriate their safe foreign assets or not. This decision takes place after they have decided to roll over their domestic investment (i.e., $x_i > \bar{x}^*(a)$). In equation (10), 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.

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 9 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 sudden stop in net flows 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. □

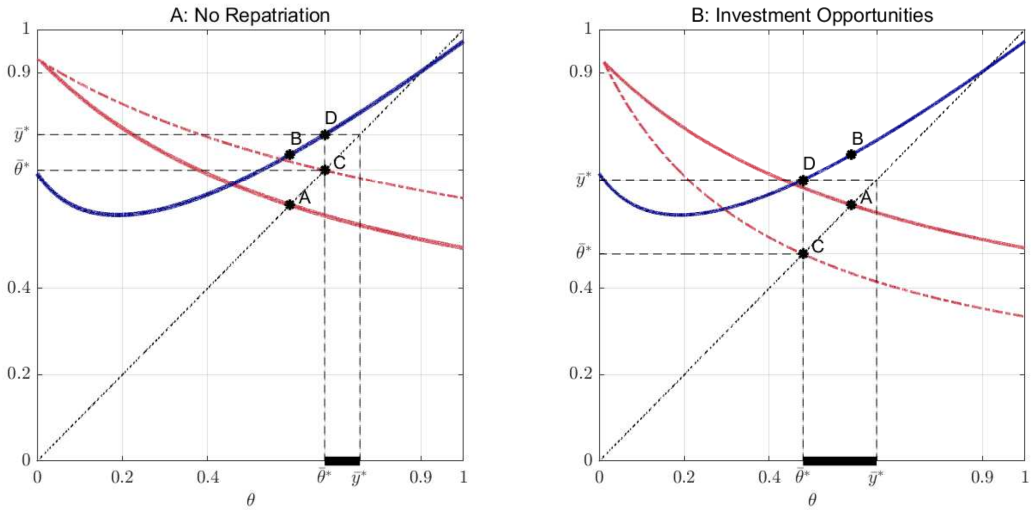
B.2 Model Extensions

In panel A of Figure 6, 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 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 3. The lack of repatriation does not preclude the existence of prevention, but the requirements on fundamentals and investment returns are more stringent to achieve it.

In panel B of Figure 6, 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 in the f-investor curve (in solid blue), but 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.

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).

Figure 6: Alternative Scenarios



B.3 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:

$$\underbrace{\underline{\pi}^{*}\Big(R\left((1+\beta)+a\left(\underline{x}^{**}\right)\right)+(1+r^{f})\left((1+\beta)-a\left(\underline{x}^{**}\right)\right)\Big)}_{\text{Roll Over + Solvency}} + \tag{11}$$

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

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:

$$\underbrace{\underline{\pi}^{**}\left(R\left((1+\beta)+\tilde{e}(1-\beta)\right)\right)}_{\text{Roll over + Repatriation}} = \underbrace{\bar{\pi}^{**}\Big(R(1+\beta)+(1+r^{f})(1-\beta)\Big)+(1-\bar{\pi}^{**})\Big((1-\beta)(1+r^{f})\Big)}_{\text{Roll over + No Repatriation}} \tag{12}$$

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 (13), such that for any realization of $\theta < \underline{\theta}^{*}$ there is a sudden stop as the economy becomes insolvent:

$$\ell(\theta) = \tilde{\lambda}_2 Pr\left(x_i \leq \underline{x}^{*}(0) \middle| \theta = \underline{\theta}^{*} \right) = \underline{\theta}^{*} \tag{13}$$

C Additional Tables

Table 7: Prevented Sudden Stops including Reserves: Fixed Selection Bias

	λ=0	λ=-0.5	λ=-0.99
	(1)	(2)	(3)
Outcome Equation: Prevented			
Global growth	0.098	0.093	0.040
	(0.080)	(0.072)	(0.029)
VXO	-0.014	-0.020**	-0.021***
	(0.010)	(0.009)	(0.004)
Money growth	-0.005	-0.005	-0.004
	(0.016)	(0.013)	(0.006)
Interest rate	-4.401	-6.279*	-6.354***
	(3.686)	(3.538)	(2.097)
Contagion	-0.204	-0.352**	-0.441***
	(0.165)	(0.149)	(0.078)
GDP forecast 1 year ago	0.084**	0.110***	0.100***
	(0.033)	(0.032)	(0.021)
CPI forecast 1 year ago	-0.068***	-0.060***	-0.016***
	(0.020)	(0.017)	(0.004)
Reserves as months of imports	-0.051*	-0.040	-0.008
	(0.030)	(0.027)	(0.011)
Constant	0.067	1.207***	2.266***
	(0.511)	(0.461)	(0.207)
Selection Equation: FSS			
Global growth	-0.014	-0.014	-0.014
	(0.019)	(0.019)	(0.019)
VXO	0.018***	0.018***	0.018***
	(0.003)	(0.003)	(0.003)
Money growth	0.003	0.003	0.003
	(0.006)	(0.006)	(0.006)
Interest rate	5.593***	5.606***	5.658***
	(1.428)	(1.430)	(1.420)
Contagion	0.396***	0.396***	0.389***
	(0.059)	(0.059)	(0.058)
GDP forecast 1 year ago	-0.086***	-0.087***	-0.088***
	(0.017)	(0.017)	(0.017)
CPI forecast 1 year ago	-0.001	-0.001	-0.001
	(0.001)	(0.001)	(0.001)
Reserves as months of imports	-0.011*	-0.011*	-0.012*
	(0.007)	(0.007)	(0.007)
Constant	-1.924***	-1.925***	-1.919***
	(0.121)	(0.121)	(0.120)
Observations	5971	5971	5971

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Source: Authors' elaboration.Notes: Standard errors are reported in parenthesis.*** (**) [*] denotes significance at the 1 (5) [10] percent level.

Table 8: Selection Equation: Fixed Selection Bias

	λ=0	λ=-0.5	λ=-0.99
	(1)	(2)	(3)
Selection Equation: FSS			
Global growth	-0.058***	-0.058***	-0.058***
	(0.017)	(0.017)	(0.017)
VXO	0.022***	0.022***	0.022***
	(0.003)	(0.003)	(0.003)
Money growth	0.001	0.001	0.001
	(0.005)	(0.005)	(0.005)
Interest rate	3.497***	3.502***	3.518***
	(1.226)	(1.226)	(1.215)
GDP forecast 1 year ago	-0.097***	-0.098***	-0.098***
	(0.015)	(0.015)	(0.015)
CPI forecast 1 year ago	-0.001*	-0.001*	-0.001*
	(0.001)	(0.001)	(0.001)
Constant	-1.650***	-1.650***	-1.651***
	(0.107)	(0.107)	(0.106)
Observations	6758	6758	6758

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Source: Authors' elaboration.Notes: Standard errors are reported in parenthesis.*** (**) [*] denotes significance at the 1 (5) [10] percent level.

Table 9: Fixed Selection Bias: Selection Equation

	Panel A: $\lambda = -0.5$					
	(1)	(2)	(3)	(4)	(5)	(6)
Selection Equation: Foreigners' Sudden Stops						
Global growth	-0.051***	-0.063***	-0.042**	-0.059***	-0.058***	-0.046**
	(0.018)	(0.018)	(0.018)	(0.017)	(0.017)	(0.019)
VXO	0.022***	0.022***	0.018***	0.021***	0.022***	0.016***
	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.004)
Money growth	0.001	0.002	0.008	0.001	0.001	0.009
	(0.005)	(0.006)	(0.006)	(0.005)	(0.005)	(0.006)
Interest rate	2.065	3.577***	3.924***	1.430	3.483***	1.050
	(1.276)	(1.290)	(1.347)	(1.320)	(1.226)	(1.497)
GDP forecast 1 year ago	-0.136***	-0.127***	-0.119***	-0.108***	-0.099***	-0.168***
	(0.017)	(0.017)	(0.017)	(0.015)	(0.015)	(0.019)
CPI forecast 1 year ago	-0.005**	-0.002	-0.000	-0.002**	-0.001*	-0.004**
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Financial development	-0.905***					-0.910***
	(0.128)					(0.162)
Financial openness		-0.261***				-0.034
		(0.080)				(0.098)
Government stability			-0.001			0.011
			(0.016)			(0.017)
Fiscal rule quality				-0.507***		-0.411***
				(0.109)		(0.117)
Floating exchange rate					-0.058	0.218**
					(0.087)	(0.092)
Constant	-1.055***	-1.349***	-1.611***	-1.405***	-1.639***	-0.868***
	(0.137)	(0.137)	(0.150)	(0.115)	(0.109)	(0.179)
	Panel B: $\lambda = -0.99$					
	(1)	(2)	(3)	(4)	(5)	(6)
Selection Equation: Foreigners' Sudden Stops						
Global growth	-0.050***	-0.063***	-0.042**	-0.059***	-0.057***	-0.044**
	(0.018)	(0.017)	(0.018)	(0.017)	(0.017)	(0.018)
VXO	0.022***	0.022***	0.018***	0.021***	0.022***	0.016***
	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.004)
Money growth	0.001	0.002	0.008	0.001	0.001	0.009
	(0.005)	(0.006)	(0.006)	(0.005)	(0.005)	(0.006)
Interest rate	2.049	3.578***	3.907***	1.430	3.514***	1.026
	(1.263)	(1.280)	(1.338)	(1.308)	(1.212)	(1.478)
GDP forecast 1 year ago	-0.136***	-0.128***	-0.118***	-0.109***	-0.099***	-0.168***
	(0.016)	(0.017)	(0.017)	(0.015)	(0.015)	(0.019)
CPI forecast 1 year ago	-0.005**	-0.002	-0.000	-0.002**	-0.001*	-0.004**
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Financial development	-0.911***					-0.906***
	(0.127)					(0.160)
Financial openness		-0.267***				-0.038
		(0.080)				(0.097)
Government stability			-0.003			0.008
			(0.015)			(0.017)
Fiscal rule quality				-0.508***		-0.418***
				(0.108)		(0.117)
Floating exchange rate					-0.059	0.225**
					(0.087)	(0.092)
Constant	-1.054***	-1.344***	-1.598***	-1.405***	-1.641***	-0.851***
	(0.136)	(0.137)	(0.148)	(0.114)	(0.107)	(0.176)
Observations	6758	6758	6490	6336	6758	6758
6239						

* p<0.1, ** p<0.05, *** p<0.01

Source: Authors' elaboration.Notes: Standard errors are reported in parenthesis.*** (**) [*] denotes significance at the 1 (5) [10] percent level.

Table 10: Probit: Prevented Sudden Stops

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Global growth	0.093	0.061	0.104	0.038	0.091	0.078	0.055
	(0.080)	(0.081)	(0.084)	(0.090)	(0.080)	(0.080)	(0.090)
VXO	-0.013	-0.013	-0.017	-0.026**	-0.013	-0.012	-0.027**
	(0.010)	(0.010)	(0.011)	(0.012)	(0.010)	(0.010)	(0.011)
Money growth	-0.006	-0.006	-0.006	-0.007	-0.007	-0.006	-0.005
	(0.015)	(0.016)	(0.016)	(0.016)	(0.015)	(0.015)	(0.017)
Interest rate	-3.375	-2.999	-2.397	-2.086	-3.727	-2.947	-2.348
	(3.605)	(3.667)	(3.806)	(3.766)	(3.760)	(3.590)	(4.165)
Contagion	-0.225	-0.251	-0.204	-0.232	-0.224	-0.228	-0.217
	(0.163)	(0.165)	(0.168)	(0.178)	(0.163)	(0.162)	(0.184)
GDP growth forecast 1 year ago	0.070**	0.105***	0.126***	0.079**	0.069**	0.075**	0.179***
	(0.031)	(0.033)	(0.035)	(0.033)	(0.032)	(0.032)	(0.040)
Inflation forecast 1 year ago	-0.073***	-0.059***	-0.038***	-0.076***	-0.074***	-0.074***	-0.035***
	(0.021)	(0.019)	(0.013)	(0.020)	(0.021)	(0.023)	(0.012)
Financial development		1.081***					0.659
		(0.346)					(0.432)
Financial openness			1.051***				1.215***
			(0.268)				(0.289)
Government stability				0.137***			0.116**
				(0.048)			(0.051)
Fiscal rule quality					-0.090		-0.354
					(0.309)		(0.320)
Floating exchange rate						0.409*	0.167
						(0.224)	(0.287)
Constant	-0.093	-0.646	-1.113**	-0.788	-0.047	-0.138	-2.211***
	(0.482)	(0.506)	(0.567)	(0.578)	(0.514)	(0.478)	(0.732)
Observations	413	413	402	374	413	413	367

* p<0.1, ** p<0.05, *** p<0.01

Source: Authors'elaboration.Notes: Standard errors are reported in parenthesis.*** (**) [*] denotes significance at the 1 (5) [10] percent level.

D List of Episodes

Table 11: List of Prevented Sudden Stops

Country	Start Date	Quarter Duration	Developing
Argentina	1998q4	4	1
Australia	1997q3	3	0
Australia	2005q1	4	0
Australia	2012q2	2	0
Brazil	1985q3	3	1
Chile	2000q2	3	1
Chile	2013q3	3	1
Costa Rica	2014q2	6	1
Croatia	2004q4	4	1
Croatia	2010q2	3	1
Czech Republic	2006q2	3	1
Czech Republic	2008q4	4	1
Denmark	1986q4	3	0
Finland	2012q3	5	0
Guatemala	1999q4	8	1
India	1992q1	4	1
Latvia	1998q3	4	1
Latvia	2015q2	4	1
Lithuania	2000q4	4	1
Macedonia, FYR	2002q1	2	1
Malta	2000q1	3	0
New Zealand	2005q3	4	0
Panama	2002q1	4	1
Portugal	1999q3	2	0
Portugal	2004q4	3	0
Romania	1998q1	3	1
South Africa	2015q3	4	1
Spain	1994q2	4	0
Spain	2001q3	4	0
Sri Lanka	1994q2	2	1
Sri Lanka	1995q4	2	1
Sri Lanka	1998q3	3	1
United Kingdom	1991q3	3	0
United Kingdom	2001q3	5	0
United Kingdom	2008q2	5	0
United States	2001q3	4	0

E Variable Definition

Table 12: Description of Variables and Sources

Variable	*Definition*	*Source*
Sudden Stops		
Capital Flows	See Appendix **??**.	BOPS (BPM5 and BPM6), IMF.

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Table 12 – continued from previous page

Variable	*Definition*	*Source*
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.
Domestic Factors		
Real GDP	Level of real GDP. **This variable is used to compute the impulse responses of Section 5.**	World Development Indicators.
Real consumption	Level of real consumption. **This variable is used to compute the event study section 5.**	World Development Indicators.
Real investment	Level of real investment. **This variable is used to compute the event study section 5.**	World Development Indicators.
Real government spending	Level of real spending. **This variable is used to compute the event study section 5.**	World Development Indicators.
Real exports	Level of real exports. **This variable is used to compute the event study section 5.**	World Development Indicators.
Real imports	Level of real imports. **This variable is used to compute the event study section 5.**	World Development Indicators.
Real credit to the private sector	Level of real credit to the private sector. **This variable is used to compute the event study section 5.**	World Development Indicators.

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Table 12 – continued from previous page

Variable	*Definition*	*Source*
Real bilateral exchange rate	Level of real bilateral exchange rate. **This variable is used to compute the event study section 5**	Darvas (2021).
GDP growth forecast	Year-on-year growth rate of real GDP (quarterly).	World Economic Outlook - IMF.
CPI growth forecast	Year-on-year growth rate of CPI (quarterly).	World Economic Outlook - IMF.
Current account (CA)	Current account balance from the Balance of Payments (quarterly).	BOPS (both BPM5 and BPM6), IMF.
Fiscal rule quality	Index that reflects the quality of a country fiscal rule for those who has one. This indicator captures relevant design features of fiscal rules: legal basis, broad institutional coverage, enforcement procedures and flexibility mechanisms to respond to shocks. It takes the value of 0 for countries without a fiscal rule and a value from 0 to 1 that measure the quality of the fiscal rule, with 1 being the maximum level of quality.	IMF.
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.
Government stability	Index of the governmentâs ability to carry out its declared program(s), and its ability to stay in office.	Political Risk Services Group.
Financial development	Index measuring a country's degree of financial development.	IMF.
Financial openness	Index measuring a country's degree of capital account openness.	Chinn and Ito (2006).
Floating exchange rate	Monthly fine classification (1-15) of countries according to their exchange rate regime. Floating exchange rate 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).
International Investment Position	Stock of international assets and liabilities. Annual frequency.	BOPS (BPM5 and BPM6), IMF.
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 13: Summary Statistics

Variable	Obs	Mean	Std. dev.	Min	Max
Global growth (%)	8035	2.89	1.15	-3.71	5.43
VXO	8035	19.65	7.26	8.65	61.88
Money growth (%)	9240	6.94	6.08	-8.19	22.29
Interest rate (%)	9480	0.06	0.04	0.01	0.15
Contagion	9480	0.40	0.49	0.00	1.00
GDP forecast (%)	6909	3.57	1.88	-10.00	18.00
Inflation forecast (%)	6901	5.58	17.80	-3.80	900.00
Financial development	9300	0.41	0.24	0.00	1.00
Financial openness	8335	0.64	0.36	0.00	1.00
Government stability	7502	7.81	1.85	1.00	12.00
Fiscal rule quality	9300	0.16	0.27	0.00	1.00
Floating exchange rate	9480	0.08	0.28	0.00	1.00