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A New Taxonomy of Sudden Stops:

Which Sudden Stops Should Countries Be Most Concerned About?

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Abstract*

This paper proposes a new taxonomy of Sudden Stops comprised of seven categories with definitions depending on the behavior of gross and net capital flows. The incidence of different types of Sudden Stops is tracked over time and the type of Sudden Stop related to economic performance. Sudden Stops in Net Flows associated with reductions in Gross Inflows are more disruptive than those where surges in (only) Gross Outflows dominate. The paper further discusses the mechanisms that might result in Sudden Stops in Gross Flows that are not Sudden Stops in Net Flows, such that shifts in financial assets or liabilities do not require a sharp current account adjustment. Still, it is found that Sudden Stops in Gross Inflows that do not provoke a sharp contraction in Net Flows may also be disruptive, including Sudden Stops that are driven by "other flows"—which include banking flows. The results suggest new avenues for research and future policy analysis.

JEL classifications: F30; F32; F40
Keywords: Capital flows, Sudden Stops, Financial crises, Current account adjustment, Credit booms, Leverage

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1. Introduction

While Net Capital Flows between capital exporting and capital importing countries grew substantially in the 1990s, peaking before the global financial crisis, Gross Capital Flows have risen much more dramatically (see Figure 1). Indeed, for Advanced Economies, Net Capital Flows were relatively small compared to the massive increase in Gross Flows over this period. This increase might be interpreted as an indicator of increasing financial integration and the flow counterpart of the increased stocks of financial assets and liabilities as documented in Lane and Milesi-Ferretti (2001 and 2007).

Figure 1. Gross and Net Flows: Advanced and Developing Economies

Developing economies tend to be capital importers, as reflected in positive Net Flows which, as shown in Figure 1, tend to be driven by the movement of Gross Inflows. More recently, there have also been substantial offsetting movements in Gross Inflows and Outflows for both sets of countries. The global financial crisis has highlighted the risks of enhanced financial integration and the potential effects of abrupt changes in these flows, which remain a topic of considerable interest for both research and for policy.

This interest has tended to focus on certain aspects of Gross and Net Capital Flows with the particular emphasis arguably depending on the epoch. For example, in the 1980s there was considerable interest in "capital flight" from emerging economies, or in other words, surges in Gross Capital Outflows (the flows of residents); see, for example Cuddington (1986) and Dooley

(1986). In the 1990s and 2000s, the focus turned to Sudden Stops, which were normally defined as an abrupt reversal in Net Flows. It was found that such a Sudden Stop, and the associated real exchange rate depreciation and current account adjustment, resulted in significant output losses for affected economies (see Calvo, 1998; Calvo, Izquierdo and Mejía, 2004 and 2008; Guidotti, Sturzenegger and Villar, 2004; and Cavallo and Frankel, 2008). It was also postulated that the conditions that made Sudden Stops disruptive were more prevalent in developing countries.

More recently, there has been renewed interest in the behavior of Gross Flows. Cowan and De Gregorio (2007), Calderón and Kubota (2013), Rothenberg and Warnock (2011) and Forbes and Warnock (2012) are examples of recent papers that consider the role of Gross Capital Flows in the determination of Sudden Stops. These papers have established that there are different determinants of Sudden Stops that are caused by domestic vis-à-vis foreign investors, depending among other things on the roles of external vis-à-vis country idiosyncratic factors. A set of papers also consider the relationship between Gross Inflows and Outflows and macroeconomic variables. Powell, Ratha and Mohapatra (2002) showed that Gross Outflows may "Granger-cause" Gross Inflows and vice versa, and that there may be vicious and virtuous cycles between gross capital flows and macroeconomic variables. Cowan et al. (2008) and Broner et al. (2012) trace the movement of Gross Inflows and Outflows together with macroeconomic variables over episodes of surges and stops in Gross Flows.

The increase in measured Gross Capital Flows may also reflect changes in the type of flows as well as their quantity. For example, global banking may have increased certain types of flows, including those within individual global banks. Indeed, it is possible that enhanced financial integration has increased the share of those flows that are simply a wash in the financial account of the balance of payments and that do not affect Net Capital Flows at all; see Borio and Disyatat (2011) for a useful discussion. These flows represent an exchange of financial claims between residents and foreigners and generate offsetting Gross Flows, some of which may even be in some sense automatic.[1] In other words, to the extent that Gross Capital Outflows by residents increase to match Gross Capital Inflows by foreigners (or vice versa), then net flows are not affected at all. Therefore, seen through the lens of the Sudden Stop literature that tended

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

to focus on Net Flows, the rise in Gross Flows—and their potential reversal—may not necessarily increase the probability of a (net flow-type) Sudden Stop.[2]

This notwithstanding, another strand of literature (i.e., Bruno and Shin 2012a and 2012b, and Shin, 2012) has emphasized the potential disruptive nature of sudden reversals in *Gross* Capital Flows, even in cases where Net Capital Flows may remain stable. This view is summarized in a report from the Committee on International Economic Policy Reform (2012), which underscored the potentially destabilizing role of debt-creating cross-border flows—for example, bank flows—during episodes of forced deleveraging. Similarly, Obstfeld (2012) argues that Gross Flows furnish the key conduit through which financial meltdown is transmitted and amplified across countries.[3] Thus, according to this view, Gross Flow reversals could still be a cause for concern for financial stability, even with stable Net Capital Flows. This line of thought has broadened the scope of the Sudden Stop literature beyond the analysis of Net Flows and into the domain of the advanced economies that were the epicenter of the global financial crisis.[4]

Our first objective in this paper is to attempt to develop a new taxonomy of Sudden Stops that integrates many of these varied contributions, presented in Section 2. In particular, we consider all the logical possibilities of Sudden Stops in Gross and Net flows. We then confront the data and detail the incidence of each type of Sudden Stop across countries and time. In Section 3 we find an interesting pattern emerges, and we relate it to stages of global financial integration. In this section, we also document how the distribution of the types of Sudden Stops has changed in advanced economies, compared to emerging economies. Interestingly, we find greater similarities between advanced and emerging economies in the post-global financial crisis era. In Section 4, we consider the movement of macroeconomic variables, specifically growth and the real exchange rate, around the different types of Sudden Stop episodes. We construct statistical tests to illustrate that some types of Sudden Stops appear to be more disruptive than others. In Section 5, we show that Sudden Stop episodes that are driven by bank flows are

[2] Sudden Stops in Gross Capital Inflows to a country would not necessarily trigger a Sudden Stop of Net Capital Flows if Gross Capital Outflows adjusted accordingly

[3] Obstfeld (2012) argues that while the concept of Net Capital Flows deserves scrutiny by policymakers, it is not all that matters. At least as important are the gross two-way asset flows that underlie Net Flows because they could wreak havoc on financial stability.

[4] Calvo (2013) conjectures that, just as the Eurozone deepened financial integration and gave rise to financial instruments that traveled in both directions (i.e., increased Gross Flows across countries), the crisis seriously interfered with financial integration as deposits in peripheral European countries stopped being perfect substitutes for deposits in German banks. In Calvo's view, this cycle of liquidity creation and destruction may be responsible for the financial fragilities revealed in recent crises.

particularly disruptive. We conclude with a discussion regarding potential implications for future research and policy.

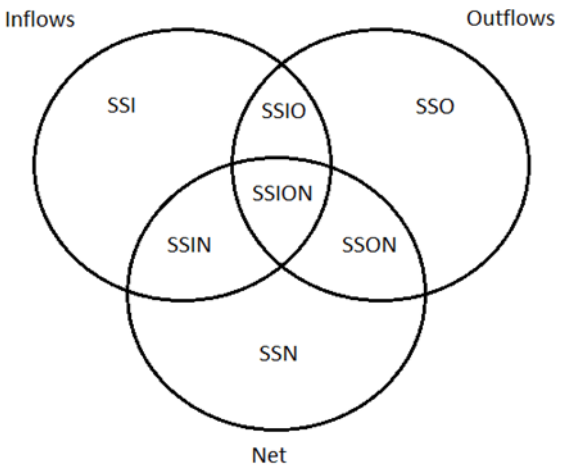
2. A New Taxonomy of Sudden Stops

As mentioned above, there has been considerable interest in the open economy macro financial literature regarding abrupt changes in capital flows, and the literature has tended to emphasize certain aspects during certain periods. During the 1980s the emphasis was on increases in capital flight or, in other words, on the Gross Outflows of residents.[5] During the 1990s and early 2000s there was a focus on Sudden Stops in Net Flows that required significant current account adjustment. In recent years, there has been a return to the consideration of Gross Flows, in terms of Sudden Stops in Inflows, Sudden Surges of Outflows and other changes in capital flows. However, the literature to date has lacked a consistent framework or taxonomy regarding the sharp reductions in capital flows entering a country that combines Gross and Net Flows, and resident and non-resident considerations.

Net Flows are simply the addition of Gross Inflows (the flows of non-residents) and Gross Outflows (the flows of residents). A Sudden Stop can be defined on the basis of Net Flows (for example, as some specified fall in Net Inflows relative to trend as in Calvo, Izquierdo and Mejía, 2004) or on the basis of Gross Flows (for example, a fall in Gross Inflows relative to the trend of Gross Inflows or a Surge in Outflows relative to the trend in Outflows, as in Forbes and Warnock, 2012). We therefore propose a new taxonomy of Sudden Stops that is illustrated in the following Venn diagram.

[5] In the 1980s a set of papers considered the phenomenon of capital flight—understood as the Gross Outflows of residents abroad—as a response to the debt crisis in LAC and other problems in developing countries. See, for example, Cuddington (1986) and Dooley (1986).

Figure 2. A Taxonomy of Sudden Stops



Logically, then, there are seven potential types of Sudden Stops.[6] Considering the very center of this figure a SSION is then separately a Sudden Stop in Inflows and a Sudden Surge in Outflows, which together imply a Sudden Stop in Net Inflows. On the other hand, an SSI is a Sudden Stop in Inflows that does not imply a Sudden Stop in Net Flows—which means it must be "financed" by a reduction in Outflows. SSO is a Surge in Outflows that is not a Sudden Stop in Net Flows and hence must be "financed" by an increase in Inflows. SSN is a Sudden Stop in Net Flows that is not a Sudden Stop in Inflows or Outflows; according to the precise empirical definitions developed below it is a milder reduction in Gross Inflows and increase in Gross Outflows such that it qualifies as neither a Sudden Stop nor a Sudden Surge, respectively, and yet the fall in Net Flows does qualify as a Sudden Stop; we return to the precise empirical definitions below. SSIN is a Sudden Stop in Inflows that is also a Sudden Stop in Net Flows, and SSON is a Sudden Surge in Outflows that is also a Sudden Stop in Net Flows. Logically an SSIO is a Sudden Stop in Inflows and a Sudden Surge in outflows that is not a Sudden Stop in Net Flows. However, while this may be a logical possibility, in practice it is unlikely to occur, and we find no such episodes in the data. We will disregard this last type of episode in what follows.

Relating this taxonomy to the literature, in the 1980s, given the concern with capital flight the focus was then on SSO-type episodes, although in general the literature did not

[6] The full taxonomy is explained in greater detail in the Appendix.

distinguish between SSO, SSON and SSION. In the 1990s the focus shifted more to Sudden Stops in Net Flows. The definitions adopted tended to aggregate SSN, SSIN, SSON and SSION and hence did not distinguish between Net Flows Sudden Stops that were dominated by a fall in Inflows and those associated with a surge in Outflows. That said, additional filters were added that may have stressed more SSIN and SSION-type episodes.[7] In more recent papers, the role of Gross Inflows and Gross Outflows has been considered; see, for example, Rothenberg and Warnock (2011). However, to date, while many papers have considered some of the types of episodes defined by this taxonomy or some unions of these different types of episodes, no paper to our knowledge has developed and considered the full taxonomy of Sudden Stop episodes as constructed here.

3. Considering the Data and Refining Definitions

3.1 Data and Definitions

In the balance of payments convention, *Gross Capital Inflows* are defined as the changes in the stock of international liabilities owed by residents. There are three subcomponents of Gross Capital Inflows: i) direct investment in the reporting economy; ii) portfolio investment liabilities (i.e., equities and bonds); and iii) other investment liabilities, which are primarily loans from non-resident banks. Gross Inflows can be either positive (i.e., a Capital Inflow to the reporting economy) or negative (i.e., a flow of capital from the reporting country to the rest of the world).[8]

Similarly, *Gross Capital Outflows* are defined as changes in the stock of foreign asset holdings of residents. There are three subcomponents of Gross Capital Outflows: i) direct investment abroad; ii) portfolio investment assets; and iii) other investment assets, which are primarily offshore deposits of residents or cross-border loans from resident banks. An increase in foreign asset holdings of residents is a Capital Outflow in the balance of payments (i.e., it is recorded with a negative sign), while a decrease in foreign asset holdings leads to capital repatriation (i.e., it is recorded with a positive sign).[9]

[7] For example, Calvo, Izquierdo and Mejía (2008) focused on "systemic sudden stops" where a Net Flow concept was employed but with an additional filter that the Sudden Stop was systemic. As we shall see below, that filter then tended to include more SSIN and SSION episodes and fewer SSON or SSN episodes.

[8] It is perhaps confusing, but the concept of Gross Inflows is in fact the net changes in the position of non-residents in financial instruments that constitute liabilities of the reporting country, while Gross Outflows are the net changes in the position of residents in financial instruments that constitute assets of the reporting country.

[9] Broner et al. (2010) include "changes in reserves" in their definition of "gross capital outflows." When a central bank accumulates international reserves, it is in essence accumulating foreign assets. However, in the balance of

Finally, the Net Capital Flows (i.e., Financial Account, net) are simply the Gross Capital Inflows *plus* the Gross Outflows.

$$Net\ Flows = Gross\ Inflows + Gross\ Outflows$$

We collected data for all the countries with available information in the IMF-IFS database since the 1980s for all the subcomponents of Gross Capital Inflows and Outflows. Following Calvo, Izquierdo and Mejía (2004) and Forbes and Warnock (2012) we annualize the quarterly data to avoid seasonality effects. In particular we define:

$$C_{t,j} = \sum_{i=0}^{3} X_{t-i,j} \quad \forall\, j = 1,2,3\ and\ t = 1,2,\dots,T$$

where $X_{t,1} = Inflows,\ X_{t,2} = Outflows$ and $X_{t,3} = Net\ Flows$

Next, we define the annual change in each of the series:

$$\Delta C_{t,j} = C_t - C_{t-4} \quad \forall j = 1,2,3\ and\ t = 5,6,\dots,T$$

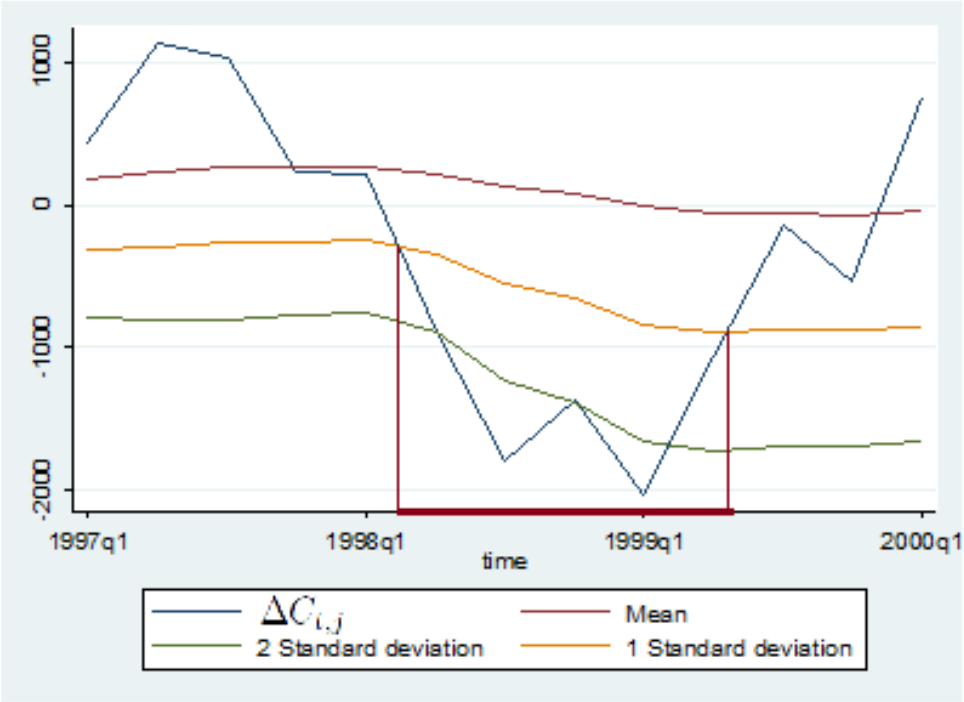
Following Forbes and Warnock (2012) we made some adjustments to the series using country-specific data.[10] After these adjustments, we keep only those countries for which we have at least 10 years (40 quarters) of consecutive data. We end up with a sample of 63 countries (32 developing and 31 advanced according to the World Bank's standard categorization).

The next step is to define each type of Sudden Stop episode. In order to do so, we follow the algorithm described in Calvo, Izquierdo and Mejía (2004). In particular, taking each series separately, we define a Sudden Stop as an episode that begins when a series ($\Delta C_{i,j}$) falls below one standard deviation of its historical mean (conditional that it subsequently falls below two standard deviations below the mean) and ends when the series exceeds one standard deviation below the mean. Figure 3 provides a graphical representation of the Calvo et al. algorithm.

payment convention—which we maintain in this paper—changes in reserve assets holdings by the central bank are distinguished from Gross Capital Outflows, which are the changes in foreign assets holding of other residents.

[10] As in Forbes and Warnock (2012) we introduced some additional modifications. First, in some cases IFS data do not differentiate well between missing values and zeros. In some cases we replaced dots with zeros. Finally, for Norway and Slovak Republic, we completed some missing values in the middle of the sample with data found in the local central banks.

Figure 3. A Graphical Representation of a Sudden Stop



An innovation in this paper is that we apply this algorithm to each series: i.e., Gross Inflows, Gross Outflows and Net Flows, separately. This then allows us to distinguish the different types of Sudden Stop episodes as described in the previous section.

We made two additional adjustments to the sample in order to avoid the inclusion of episodes that may not be associated with conditions of economic duress that are usually prevalent during Sudden Stops. First, we dropped episodes in which the change in either Gross or Net Flows occurred during a period of *bonanza* in the country's terms of trade.[11] An exogenous increase in the terms of trade may result in lower Capital Inflows (Gross and Net) due to the appearance of alternative sources of financing (i.e., a positive shock to the balance of payments).[12]

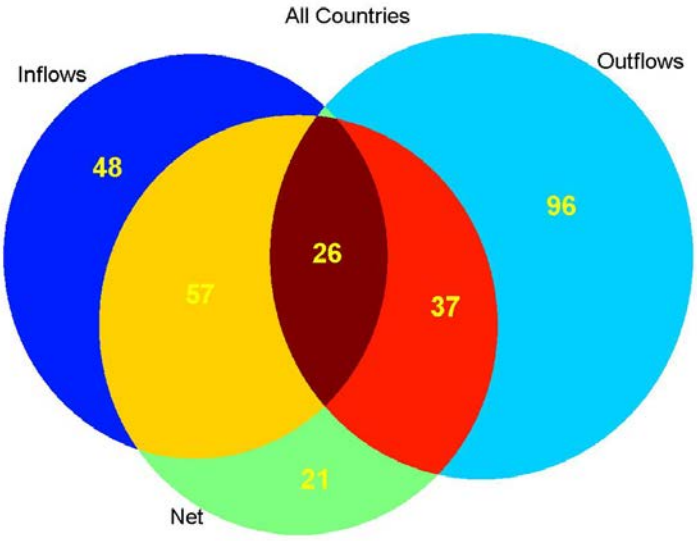
[11] "Bonanza" in terms of trade in defined as an annual increase in the country's terms of trade of more than 4 percent, which is approximately the 75th percentile of the distribution of terms of trade changes in the entire sample.
[12] With this filter we drop 103 episodes or 25 percent of the episodes in the sample. Notwithstanding this, the results we present in this paper are similar when we do not apply this filter (results available upon request).

Second, we also drop episodes of Surges in Gross Outflows (SSO) where the Surge occurred concurrently with a *significant* increase in Net Capital Inflows.[13] The joint occurrence of the two events (i.e., an increase in Gross Outflows and an increase in Net Inflows) suggests that the surge in Gross Capital Outflows is part of a sharp increase in financial integration; or portfolio diversification could be residents' response to a significant increase in Gross Capital Inflows to the economy. These periods are thus likely related to a sharp increase in financial integration.[14]

3.2 Episodes in the Sample

Figure 4 summarizes the episodes found in our sample according to the taxonomy described above. There are a total of 285 episodes in the full sample (out of a total of 5,798 country/quarter observations). The area of each set and each subset is consistent with the proportion of those types of episodes in the total. In particular, we find 96 SSO, 57 SSIN, 48 SSI, 37 SSON, 26 SSION and 21 SSN episodes in the dataset across all countries. As mentioned, we find zero SSIO episodes.

Figure 4. Sudden Stop Episodes Detected in the Sample

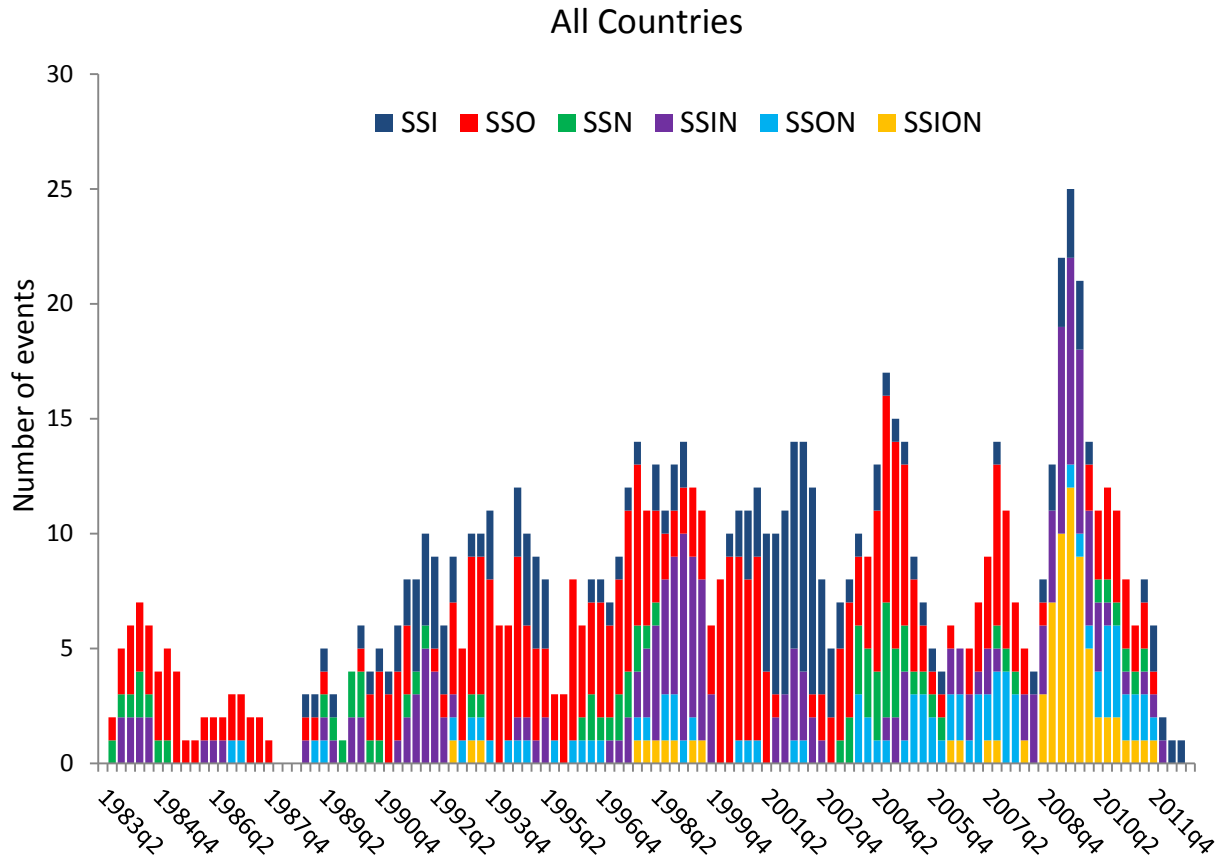


[13] We experiment with the precise definition of "significant." In the baseline case, we drop all episodes in which the increase in Net Flows was larger than 2 standard deviations above the mean. However, the results are robust when we use a more stringent threshold by dropping all episodes associated with any increase in Net Flows.

[14] With this filter we drop 26 SSO episodes, which represent 21 percent of the SSO episodes in the unrestricted sample and 8.3 percent of total episodes.

There is also considerable bunching of Sudden Stop episodes at particular time periods. Figure 5 plots the different types of Sudden Stops over time. As can be noted, there is a preponderance of SSIN and SSI-type events in the late 1990s and the early 2000s. This is consistent with our brief description of the stages in the literature that appeared to focus on Net Flow Sudden Stops (largely driven by Sudden Stops in Inflows) in the 1990s and 2000s. Interestingly, around the time of the global financial crisis there were a set of different types of episodes including SSO events in the years immediately before the crisis, and many SSION but also SSIN-type events immediately after the crisis.[15] As noted, the global financial crisis provoked a set of SSION events that are thus associated with both a Sudden Stop in Inflows and a Sudden Surge in Outflows.

Figure 5. Sudden Stop Episodes over the Sample Period



[15] Calderón and Kubota (2013) find greater bunching of Sudden Stop episodes where the Sudden Stop is related to a sharp fall in Inflows rather than a Sudden Surge in Outflows. We do not find this result strongly in our dataset when the full taxonomy is considered.

Table 1 details descriptive statistics regarding these episodes. The average durations are quite similar across the different types, from 2.3 to 3.5 quarters, but as can be seen, the mean changes in Inflows, Outflows and Net Flows (in terms of the standard deviation of the corresponding series) are different. As is to be expected, the Net Flow-type Sudden Stops (SSN, SSIN, SSON and SSION) have large changes in Net Flows (i.e., fall in net capital flows ranging between 2.36 and 4.33 standard deviations of Net Flows); however, the intensity of the variation in either Gross Inflows or Outflows varies by type of episode. The Sudden Stops in Inflows (SSI, SSIN, SSION) have large changes in Inflows (fall ranging between 2.77 and 3.88 standard deviations of Gross Inflows) while the Sudden Surges in Outflows (SSO, SSON) have large changes in Outflows (surges in Gross Outflows ranging between 2.79 and 3.79 standard deviations of Gross Outflows). Overall, the SSION episodes display the largest changes in Gross and Net Capital Flows.

Table 1. Sudden Stop Episodes, Descriptive Statistics

Episodes	Frequency	Mean Changes (in S.D.) in:			Duration (quarters)
		Inflows	Outflows	Net	
SSI	48	-2.77	1.21	-0.93	3.35
SSO	96	0.94	-2.79	-0.60	3.55
SSN	21	-0.99	-1.30	-2.36	3.33
SSIN	57	-3.33	-0.04	-3.02	3.05
SSON	37	-0.08	-3.00	-2.82	2.35
SSION	26	-3.88	-3.79	-4.33	2.73

3.3 Sudden Stops in Advanced and in Developing Countries: How Have They Changed?

Figures 6 and 7 illustrate the incidence of Sudden Stops in Developing and in Advanced Countries separately over time, using country definitions as per the World Bank's standard classification.[16] Given the focus of the literature in the 1990s and early 2000s on developing countries, it is perhaps surprising that Advanced Countries have experienced Sudden Stops to the extent illustrated in the figure below. It is also the case that Advanced Economies have suffered from different types of Sudden Stops. In particular, as perhaps can be noted until the global

[16] See Appendix Table A.1 for the list of advanced and developing countries in the sample.

financial crisis, the incidence of Net Flow-type Sudden Stops in Advanced Economies (SSIN, SSON and SSION) has been much less than in the case of developing countries.

Figure 6. Incidence of Sudden Stops by Type: Developing Countries

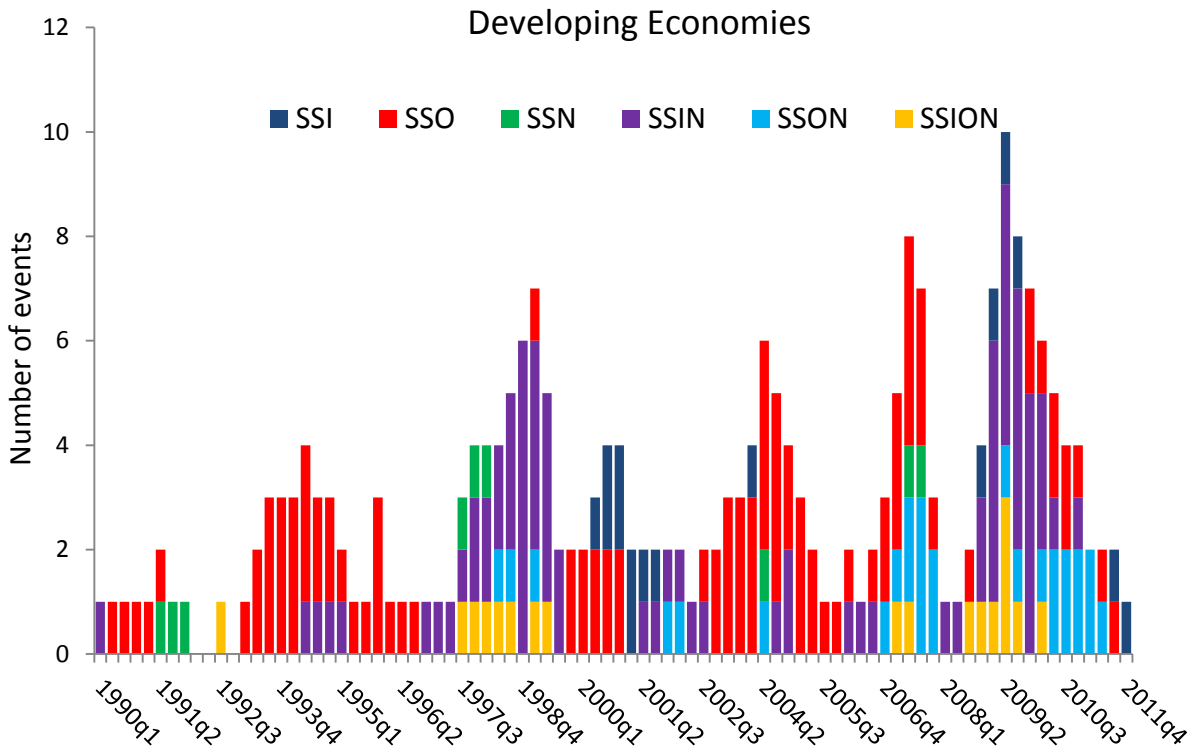
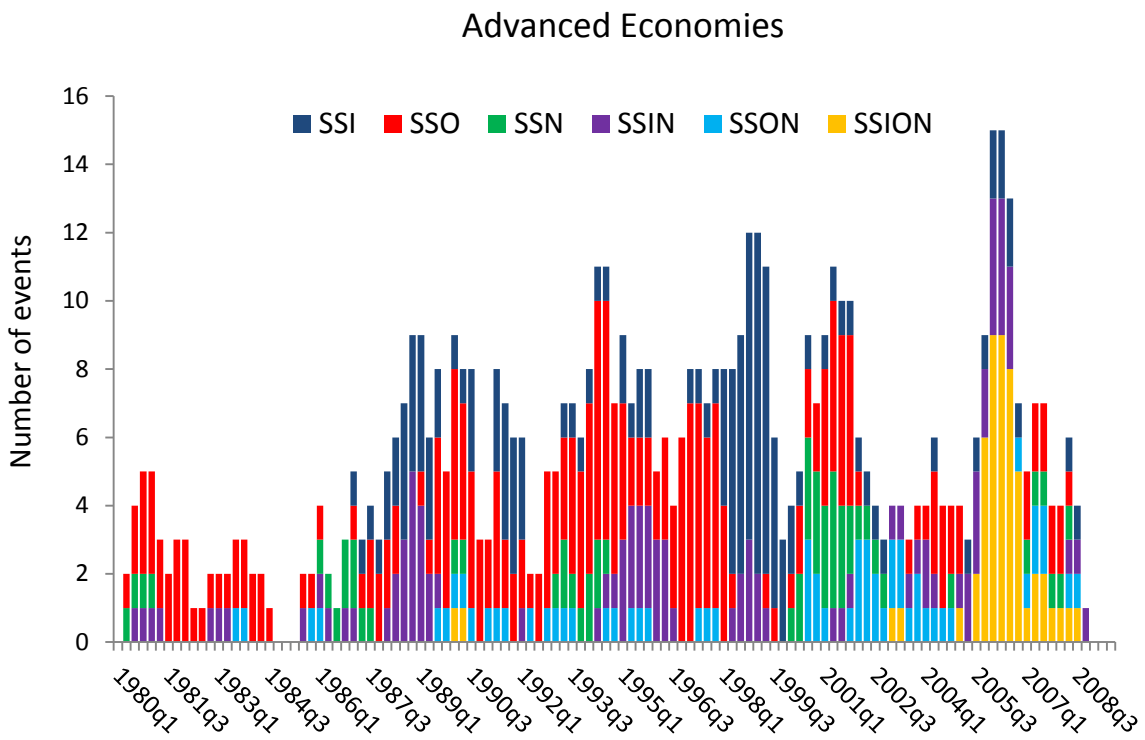


Figure 7. Incidence of Sudden Stops by Type: Advanced Countries



This characteristic may also be illustrated by dividing the sample pre- and post-2000, and asking how the incidence of Sudden Stops by type has changed. To illustrate, in Figures 8 and 9 we plot the Venn diagrams for Developing and Advanced Economies, pre- and post-2000, respectively.

Figure 8. Incidence of Sudden Stops in Developing Countries before and after 2000

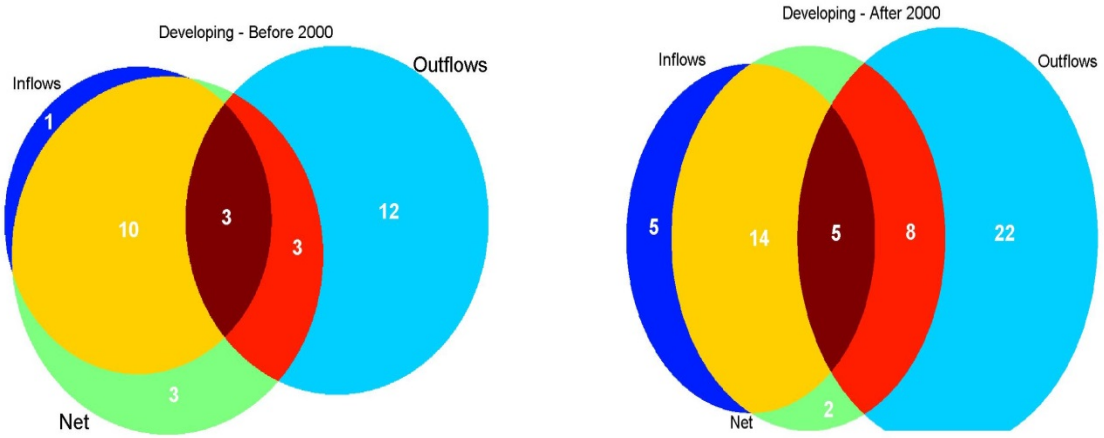
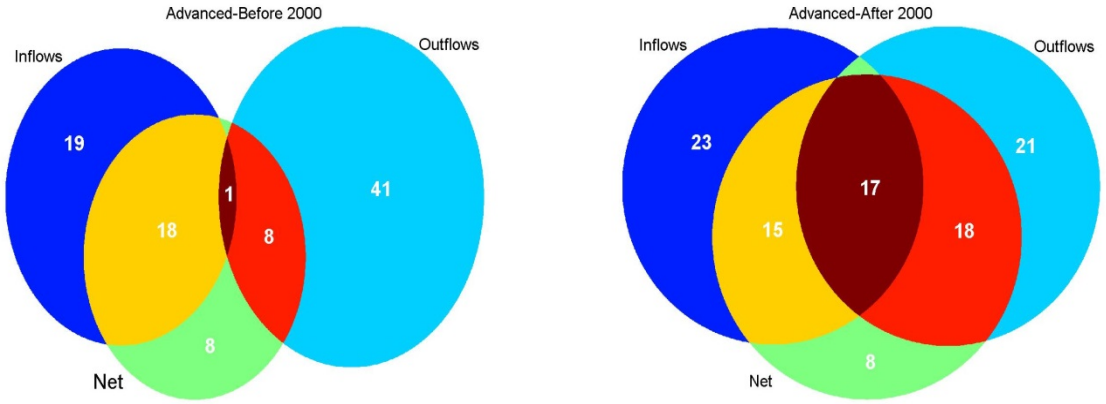


Figure 9. Incidence of Sudden Stops in Advanced Countries before and after 2000



These four Venn diagrams illustrate a number of interesting facts. For Developing Countries in the pre-2000 period the majority of Sudden Stops in Inflows were also Net Flows Sudden Stops; the two circles representing Sudden Stops in Inflows and Sudden Stops in Net Flows largely overlap. This implies that for developing countries in this period Sudden Stops in Inflows were almost synonymous with Sudden Stops in Net Flows. On the other hand, Sudden Surges of Outflows were not always Sudden Stops in Net Flows. In the post-2000 period these patterns changed. First, the incidence of Net Sudden Stops became more balanced between episodes that originated in sharp falls in Gross Capital Inflows, and those that originated in sudden starts in Gross Capital Outflows. Second, the frequency of "SSI" and "SSO" episodes increased, suggesting that there was more offsetting between Gross Outflows and Gross Inflows during this period.

In the case of Advanced Economies, pre-2000, there is very little overlap between the circles representing Sudden Stops in Inflows and Sudden Surges in Outflows, and the overlap with each of these circles and that representing a Sudden Stop in Net Flows is also less than that same overlap in the case of Developing countries. This is consistent with the view that in this earlier period the incidence of Sudden Stops in net flows was much lower in Advanced Economies; however, these countries suffered from Sudden Stops in Gross Flows. This in turn suggests that those Sudden Stops in Gross Flows were in some fashion financed within the capital account; they did not require a sharp adjustment in the current account, for example. However, in the post-2000 period, this changed: Advanced Economies suffered more Sudden

Stops in Net Flows. In the post-2000 period it thus appears that Advanced Economies have become much more similar to developing economies in this regard.[17]

Having explored the data in relation to the taxonomy of Sudden Stops, we now turn to the question of which Sudden Stops should countries be most concerned about. To address this question, we assess what happens to output and the real exchange rate in the aftermath of the different types of episodes.

4. Output and Real Exchange Rate Dynamics in the Aftermath of Sudden Stops

There are several channels through which Sudden Stops may be disruptive when they materialize: they may dry up the external financing of the balance of payment, forcing a large contraction in imports; they could force rapid deleveraging of the economic agents that have external debts; and they could precipitate a financial crisis. All these channels have been associated with output collapses. Sudden Stops also usually entail real devaluations, as the affected countries have to adjust to a tighter financing constraint.[18] Therefore, in order to assess how disruptive Sudden Stops are, we focus on the behaviors of output and the real exchange rate in the aftermath of Sudden Stops.

4.1 Empirical Strategy

We construct a simple statistical test to evaluate the macroeconomic impacts of different types of Sudden Stops. For every one of the 285 episodes in the sample, we set t=0 at the quarter when the Sudden Stops began. Subsequently, we explore the behavior of real GDP (quarterly, seasonally adjusted) 10 quarters before and 10 quarters after the beginning of the Sudden Stop. We do the same thing with the real effective exchange rate (RER, quarterly). In order to ensure

[17] The increase in the frequency of net sudden stops in Advanced Economies in the 2000s came primarily at the expense of a lower frequency of SSO. In fact, while in the pre-2000 period 82 percent of the episodes in the "Outflows" circle were SSO, this share declined to 38 percent in the post-2000 period. In addition to this, there was also a significant increase in the share of "Inflows" episodes in the post-2000 period. In particular, the size of "Inflows" circle grew in the latter period as total share of "Inflows"-related episodes increased to 54 percent of the total in the post-2000 period from 40 percent in the pre-2000. Finally, out of the total "Inflows" episodes, a larger share was net Sudden Stops in the post-2000 period (57 percent) than in the pre-2000 period (37 percent).

[18] Since the emerging market crises of the late 1990s, economists have increasingly emphasized the recessionary effects of real devaluations, particularly via the balance sheet effect: if the country's debts are denominated in foreign currency, the balance sheets of the indebted government, banks and corporations are hit in proportion to the devaluation. See Cavallo and Frankel (2008) for a discussion.

comparability across countries and time periods, we index the country-specific series to 100 at t=0.

In the first approach, we compute the average of the indexed series across all the episodes that belong to the same type of Sudden Stop. Then, for each type of Sudden Stops, the statistical test consists of comparing the intercepts of the pre- and post-episode trends of series, and evaluating if they are statistically different.

As an example consider Figure 10 which plots the average GDP index as described for those episodes classified as SSION; i.e., episodes when there are Sudden Stops in Inflows, Sudden Surges in Outflows and a Sudden Stop in Net Flows.

Figure 10. The Behavior of Real GDP during SSION-Type Sudden Stops

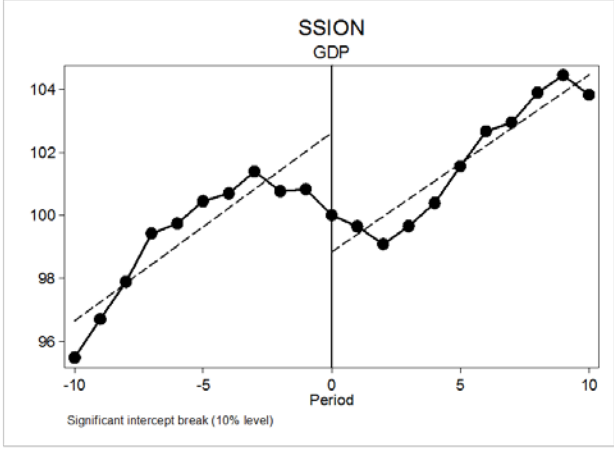


Figure 11. The Behavior of the Real Exchange Rate during SSION-Type Sudden Stops

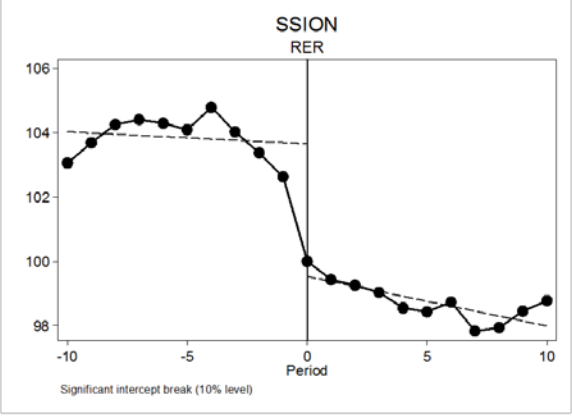


Figure 10 shows there was a significant decrease, on average, in real GDP beginning at *t*=0. The gap between the two trend lines is our measure of the (average) disruption in GDP associated with SSION episodes. Similarly, Figure 11 shows that there was significant real exchange rate depreciation associated with SSION episodes. In the Appendix we report the same charts for the six types of episodes from the taxonomy separately (Figures A.2 and A.3).

The quantitative impacts of the different Sudden Stops on real GDP (and the real exchange rate, RER) are assessed in the context of a very simple regression analysis. First, for each type of sudden stop (*j*), we regress:

$$RGDP_t = \alpha + \beta TREND(t) + \gamma^j Sudden\ Stop_t^j + \varepsilon_t \qquad (1)$$

where *j* indexes the type of Sudden Stop (i.e., SSI, SSO, etc.), RGDP is the average of the normalized real GDP series over the episode window (i.e., *t*-10 to *t*+10). *TREND (t)* takes the values 1 to 21 over the episode window. $Sudden\ Stop_t^j$ is an indicator variable that takes the value 1 during the quarters when there is a Sudden Stop of type *j* and zero otherwise (alternatively, we use a second indicator variable that takes the value 1 for all $t \geq 0$ and zero otherwise).

The coefficient estimates ($\widehat{\gamma^j}$)—one per type of Sudden Stop computed in separate regressions—provide a quantitative measure of the estimated GDP (and RER) disruption in each case. Tables 2 and 3 report the results of estimating equation (1) through OLS.

Table 2.The Estimated Effect of Different Types of Sudden Stops on Real GDP

	Dependent Variable											
	Real GDP											
	SSI		SSO		SSN		SSIN		SSON		SSION	
Trend	0.63***	0.59***	0.70***	0.76***	0.68***	0.69***	0.64***	0.42***	0.62***	0.60***	0.58***	0.32***
	(0.02)	(0.01)	(0.02)	(0.01)	(0.05)	(0.03)	(0.05)	(0.04)	(0.02)	(0.01)	(0.07)	(0.04)
Episode	-0.68**		1.00**		0.21		-3.15***		-0.34		-3.74***	
(1 if t>=0)	(0.26)		(0.41)		(0.41)		(0.61)		(0.26)		(0.82)	
Episode		-0.34*		0.34		-0.08		-0.98**		0.03		-1.50***
(1 during episode)		(0.17)		(0.21)		(0.18)		(0.35)		(0.08)		(0.48)
Constant	93.2***	93.5***	92.0***	91.7***	92.6***	92.6***	94.9***	95.8***	93.4***	93.4***	96.2***	97.3***
	(0.15)	(0.13)	(0.15)	(0.19)	(0.35)	(0.29)	(0.31)	(0.44)	(0.14)	(0.12)	(0.47)	(0.62)
Observations	21	21	21	21	21	21	21	21	21	21	21	21
R-squared	0.99	0.99	0.99	0.99	0.99	0.99	0.96	0.89	0.99	0.99	0.89	0.77

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 3. The Estimated Effect of Different Types of Sudden Stops on the Real Exchange Rate

	Dependent Variable											
	Real Exchange Rate											
	SSI		SSO		SSN		SSIN		SSON		SSION	
Trend	-0.06*	-0.10***	-0.27	-0.09	-0.01	0.08*	0.06	-0.15***	-0.06	-0.07***	-0.10*	-0.38***
	(0.03)	(0.01)	(0.35)	(0.18)	(0.08)	(0.04)	(0.05)	(0.03)	(0.04)	(0.02)	(0.05)	(0.04)
Episode	-0.64*		2.42		1.29		-3.03***		-0.01		-4.04***	
(1 if t>=0)	(0.37)		(2.78)		(0.76)		(0.57)		(0.50)		(0.54)	
Episode		-0.64***		-1.63**		0.56		-1.07***		-0.10		-1.45***
(1 during episode)		(0.08)		(0.77)		(0.40)		(0.23)		(0.31)		(0.28)
Constant	101***	102***	104***	104***	99.4***	99.0***	102***	103***	100***	100***	104***	106***
	(0.17)	(0.14)	(3.18)	(2.75)	(0.55)	(0.38)	(0.36)	(0.55)	(0.28)	(0.26)	(0.38)	(0.62)
Observations	21	21	21	21	21	21	21	21	21	21	21	21
R-squared	0.81	0.88	0.07	0.07	0.29	0.24	0.81	0.57	0.35	0.35	0.96	0.85

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

The results show the impacts of Sudden Stops on real GDP and RER are heterogeneous across the different types of Sudden Stops. For example, even though the Sudden Stop literature usually did not distinguish among Net Sudden Stops that originated in large drops in Gross Capital Inflows (i.e., SSIN episodes), large Surges in Gross Outflows (i.e., SSON episodes), large drops in Gross Inflows *and* large Surges in Outflows (i.e., SSION episodes), or mild drops in Gross Inflows together with mild Surges in Gross Outflows (i.e., SSN episodes), they all have different estimated impacts: SSIN episodes, particularly SSION episodes, are significantly more disruptive (in terms of GDP) than SSON or SSN episodes. Interestingly, SSIN and SSION episodes are also associated with significant RER depreciations—which is the main channel proposed by the literature to rationalize the output costs of Sudden Stops in emerging countries; however, SSON and SSN episodes are not associated with significant RER depreciations despite the contraction in Net Capital Flows.[19]

For SSI and SSO episodes, that is, episodes for which there is a significant drop in Capital Inflows (SSI episodes) or a Surge in Gross Capital Outflows (SSO episodes) that is *offset* by the other gross flow, the impacts on GDP and RER are either smaller or non-significant. In fact, in the case of SSI episodes there is only a mild drop in GDP, and in the case of SSO episodes there is a mild increase in real GDP (and no significant effect on RER on average). This is a priori consistent with the tenets of the literature that has emphasized the disruptive role of *Net* rather than Gross Capital Flows. However, the fact that there is heterogeneity in the responses of GDP between SSI and SSO episodes suggests that Gross Flows also matter. In particular, SSI episodes are more disruptive than SSO episodes.[20] Moreover, the output drop associated with SSIN episodes is significantly larger than for SSON episodes. These differences suggest that there is something associated with fluctuations in *Gross Capital Inflows* which makes Inflow-related episodes more disruptive than Surges in Gross Capital Outflows.

[19] This begs the question of why the real exchange failed to depreciate despite the fall in Net Capital Flows. There are at least two possibilities. First, on average these countries were not running current account deficits before the Sudden Stop (i.e., they had a balance of payments surplus). This is possible because in both cases we observe reserves were increasing before the Sudden Stop (results available upon request). Second, these episodes happen predominantly in more open economies, such that the real depreciation that is required in the aftermath of a Sudden Stop to restore external equilibrium is minimal. Cavallo (2006) shows that countries that are more open to trade have to engineer smaller real exchange rate depreciations in the aftermath of Sudden Stops.

[20] It is interesting to note that SSI episodes are also associated with statistically significant real exchange rate depreciations despite there being no significant change in net flows. However, as we will show below, this estimated effect is not robust across specifications.

To probe deeper into these results, in a second approach, instead of averaging across episodes, we pool all the episodes by type of Sudden Stop (*j*). Thus, instead of having *t*=21 observations per regression as in the previous case, we have $(t \times n^j)$ where n^j= number of episodes in each bucket *j*. Formally, for each type of Sudden Stop, we regress:

$$RGDP_{t,n} = \alpha_n + \beta TREND(t) + \gamma^j Sudden\ Stop^{\ j}_{t,n} + \varepsilon_{t,n} \qquad (2)$$

The method of estimation is OLS; we include fixed effects by episode, and the standard errors are clustered by type of episode. The advantage of equation (2) is that we gain greater power. By including fixed effects by episodes (α_n) we control for unobservable characteristics that could bias the results, and we can conduct a set of tests easily on the estimated coefficients of interest.

The results are reported in columns (3) and (4) in Tables A.3–A.14 in the Appendix (for comparability, columns (1) and (2) in each table replicate the regressions in Tables 2 and 3). The results are broadly consistent with the previous ones. The only significant change is that in the case of SSI, the coefficient estimates for SSI ($\widehat{\gamma^{SSI}}$) for GDP and RER equations are no longer statistically significant.

In an additional set of regressions, we estimate another variant of (2) where we also control for the size of the actual changes in the underlying gross and net flows (measured in terms of standard deviations). We do so because, as explained before, there are some differences across types of episodes in terms of the magnitudes. Therefore, it could be that, for example, SSION events are significantly more disruptive than others because they are the type of episodes with the largest variations in Capital Flows. In order to account for this, we test if the quantitative measure of the estimated GDP disruption, captured by the coefficient estimates ($\widehat{\gamma^j}$), is robust after controlling by the size of the changes in Capital Flows. Formally, for each type of Sudden Stop we regress:

$$RGDP_{t,n} = \alpha_n + \beta TREND(t) + \gamma^j Sudden\ Stop^{\ j}_{t,n} + \delta^i \Delta KF^i_{t,n} + \varepsilon_{t,n} \qquad (3)$$

where $\Delta KF^i_{t,n}$ is the change in Capital Flow *i=Gross Inflows, Gross Outflows and Net Flows*, respectively (we include all three simultaneously), measured in terms of standard deviations from the mean. The results are reported in columns (5) and (6) of Tables A.3–A.14 in the Appendix. We do not find significant changes to the baseline results. Interestingly, controlling by

the size of the changes in the Capital Flows, the coefficient estimates ($\widehat{\gamma^J}$) for SSI episodes are again negative and significant in the GDP equation as in the baseline regressions, but not in the RER equation.

In summary, the evidence that emerges from the regression results of equations (1) to (3) suggests two major regularities. First, as expected, only Sudden Stops in Net Capital Flows have significant and robust impacts on the RER. However, somewhat puzzlingly, there are some types of Sudden Stops in Net Flows (i.e., SSON and SSN) that do not trigger RER depreciations. Second, in terms of GDP, there is also heterogeneity in the results, with Sudden Stops in Net Capital Flows being more disruptive than Sudden Stops in Gross Flows. More surprisingly, it seems that Inflow-related episodes are more disruptive than Outflow-related episodes.

So far, we have estimated the regressions for each type of episode separately. Next, we estimate the same regressions pooling across all the episodes, adding a dummy for the type of episode. In this case we estimate three different models. The first is as follows:

$$RGDP_{t,n,j} = \alpha_n + \beta TREND(t) + \overline{\gamma} Episode_{t,n,j} + \varepsilon_{t,n,j} \qquad (4)$$

where $Episode_{t,n,j}$ takes the value 1 when there is a Sudden Stop of *any* type j within the window *t*. Therefore, using a pooling model, we estimate the average impact ($\overline{\gamma}$) of all the different types of Sudden Stops. We also estimate another variant where we control for the size of the change in the underlying capital flows:

$$RGDP_{t,n,j} = \alpha_n + \beta TREND(t) + \overline{\gamma} Episode_{t,n,j} + \delta^i \Delta KF^i_{t,n,j} + \varepsilon_{t,n,j} \qquad (5)$$

Finally, we estimate equations (4) and (5) but allowing a different coefficient $\widehat{\gamma_j}$ for each type of Sudden Stop. Formally, we estimate:

$$RGDP_{t,n,j} = \alpha_n + \beta TREND(t) + \gamma_j Episode_{t,n,j} + \varepsilon_{t,n,j} \qquad (6)$$

and

$$RGDP_{t,n,j} = \alpha_n + \beta TREND(t) + \gamma_j Episode_{t,n,j} + \delta^i \Delta KF^i_{t,n,j} + \varepsilon_{t,n,j} \qquad (7)$$

In all cases the estimation is done by pooled OLS, including episode fixed effects, and standard errors are clustered by episodes. For concreteness we focus only on the results for GDP.

Table 4.The Estimated Effect of Different Types of Sudden Stops on Real GDP: Pooled Regressions

Dependent Variable: Real GDP								
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
Trend	0.58***	0.52***	0.56***	0.53***	0.58***	0.57***	0.52***	0.53***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Episode	-0.81***		-0.51**					
(1 if t>=0)	(0.24)		(0.22)					
Episode		-0.42***		0.02				
(1 during episode)		(0.16)		(0.17)				
Dummy SSI					-1.01**	-0.82*		
(1 if t>=0)					(0.45)	(0.44)		
Dummy SSO					1.08**	1.14***		
(1 if t>=0)					(0.43)	(0.43)		
Dummy SSN					-0.00	-0.05		
(1 if t>=0)					(0.74)	(0.69)		
Dummy SSIN					-3.17***	-2.61***		
(1 if t>=0)					(0.77)	(0.77)		
Dummy SSON					-0.30	-0.07		
(1 if t>=0)					(0.91)	(0.92)		
Dummy SSION					-3.28**	-2.94*		
(1 if t>=0)					(1.51)	(1.50)		
Dummy SSI							-0.45*	0.12
(1 during episode)							(0.26)	(0.30)
Dummy SSO							0.54**	0.30
(1 during episode)							(0.22)	(0.25)
Dummy SSN							0.04	0.30
(1 during episode)							(0.49)	(0.44)
Dummy SSIN							-1.55***	-0.53
(1 during episode)							(0.45)	(0.49)
Dummy SSON							0.16	0.35
(1 during episode)							(0.51)	(0.57)
Dummy SSION							-2.82***	-1.48**
(1 during episode)							(0.54)	(0.72)
Change in Inflows (fall in sd)			-0.28***	-0.29***		-0.25**		-0.23*
			(0.10)	(0.11)		(0.10)		(0.12)
Change in Outflows (fall in sd)			-0.03	-0.04		-0.05		-0.01
			(0.09)	(0.10)		(0.09)		(0.11)
Change in Net flows (fall in sd)			-0.08	-0.09		-0.03		-0.11
			(0.09)	(0.09)		(0.09)		(0.10)
Constant	95.72***	95.96***	95.68***	95.86***	98.10***	97.72***	95.97***	95.88***
	(0.54)	(0.55)	(0.53)	(0.55)	(0.95)	(0.95)	(0.55)	(0.55)
Episode Fixed Effect & cluster	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5567	5567	5474	5474	5567	5474	5567	5474
R-squared	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Columns (a) and (b) In Table 4 correspond to the results of the estimation of equation (4); columns (c) and (d) are the results of the estimation of equation (5); columns (e) and (f) correspond to equation (6); and finally columns (g) and (h) correspond to the results of equation (7).

The first four columns show that, on average, Sudden Stops episodes are disruptive. Taking the estimates in column (a) for example, we find that on average Sudden Stops are associated with a fall in real GDP of some 0.82 percent. Moreover, when we allow for different coefficient estimates for each type of episode, we find that the effects are heterogeneous. In particular, we find that SSION and SSIN-type Sudden Stops are significantly disruptive, but this is not the case across all different types of Sudden Stops. The coefficient estimates $\widehat{\gamma_J}$ range from zero (i.e., not statically significant) in the cases of SSO, SSON and SSN to highly disruptive in the case of SSION. According to these results, SSION Sudden Stops are associated with falls in real GDP of between 1.50 percent and 3.30 percent of GDP on average. SSI and SSIN are disruptive but less so, and SSO episodes are associated with increases, although not always significantly so.

Using the results from the pooled regressions, we can formally test the difference between the coefficient estimates. In particular, we test the null hypothesis that the coefficient estimates $\widehat{\gamma_J}$ for each type of sudden stop are equal. Table 5 reports the results corresponding to the regression in column (f) of Table 4:

Table 5. Wald-Test of the Linear Equality of Coeffient Estimates from Pooled Regressions

F-Statistics of Wald Test applied to coefficient estimates of column (f), Table 4

	SSI	SSO	SSN	SSIN	SSON	SSION
SSI	-	-	-	-	-	-
SSO	5.27***	-	-	-	-	-
SSN	1.71	3.57**	-	-	-	-
SSIN	7.76***	7.82***	5.72***	-	-	-
SSON	1.72	3.59**	0.01	5.78***	-	-
SSION	4.25**	4.63**	1.96	8.61***	1.96	-

Null Hypothesis: Coefficients are equal. *** p<0.01, ** p<0.05, * p<0.1

The results suggest that the rank order of episodes from least to more disruptive in terms of GDP is:

$$SSO < SSON \leq SSN < SSI < SSIN < SSION$$

SSION episodes are found to be the most disruptive type of sudden stop, followed by SSIN and SSI. According to Table 5, the coefficient estimates are statistically different for the three types of Sudden Stops; therefore we use the symbol "<" to order them. Next, SSN and SSON are estimated to be less disruptive than the other three. However, the test fails to reject the hypothesis that the coefficients are equal for these two types of Sudden Stops; therefore, we use the symbol "≤" between them. Finally, we find that SSO episodes are associated with increases in real GDP; therefore they are the least disruptive of all.

4.2 Macroeconomic Impact in Advanced and Developing Countries

In this section we explore whether the estimated impacts of Sudden Stops are different between Advanced and Developing Countries. It may be that Advanced Economies can be hit by Sudden Stops, but that these are less disruptive than in Developing Countries. For concreteness we report only the results corresponding to equation (1) and for real GDP as the dependent variable. However, the results—available upon request—are robust across the various specifications.

Table 6. The Estimated Effect of Different Types of Sudden Stops on Real GDP: Advanced Economies

	Dependent Variable: Real GDP											
	Advanced Economies											
	SSI		SSO		SSN		SSIN		SSON		SSION	
Trend	0.59***	0.56***	0.67***	0.71***	0.60***	0.62***	0.56***	0.43***	0.61***	0.60***	0.62***	0.35***
	(0.02)	(0.01)	(0.02)	(0.01)	(0.06)	(0.03)	(0.05)	(0.03)	(0.03)	(0.01)	(0.05)	(0.04)
Episode	-0.53**		0.62**		0.23		-1.84***		-0.09		-3.90***	
(1 if t>=0)	(0.21)		(0.25)		(0.62)		(0.58)		(0.27)		(0.73)	
Episode		-0.04		0.27*		-0.60***		-0.08		-0.13		-1.79***
(1 during episode)		(0.11)		(0.14)		(0.20)		(0.22)		(0.09)		(0.40)
Constant	93.58***	93.72***	92.38***	92.19***	93.72***	93.72***	94.67***	95.16***	93.44***	93.48***	96.13***	97.33***
	(0.15)	(0.14)	(0.12)	(0.13)	(0.49)	(0.42)	(0.31)	(0.36)	(0.18)	(0.16)	(0.35)	(0.53)
Observations	21	21	21	21	21	21	21	21	21	21	21	21
R-squared	0.99	0.99	0.99	0.99	0.97	0.97	0.96	0.94	0.99	0.99	0.93	0.83

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 7. The Estimated Effect of different types of Sudden Stops on Real GDP: Developing Countries

	Dependent Variable: Real GDP											
	Developing Countries											
	SSI		SSO		SSN		SSIN		SSON		SSION	
Trend	0.93***	0.81***	0.78***	0.91***	0.96***	0.98***	0.77***	0.40***	0.66***	0.58***	0.45***	0.22***
	(0.11)	(0.05)	(0.06)	(0.03)	(0.14)	(0.07)	(0.07)	(0.05)	(0.07)	(0.04)	(0.13)	(0.07)
Episode	-1.86		1.92**		0.30		-5.35***		-1.11		-3.26**	
(1 if t>=0)	(1.38)		(0.88)		(1.59)		(0.93)		(0.73)		(1.26)	
Episode		-2.14**		0.10		1.98*		-2.50***		0.49*		0.03
(1 during episode)		(0.93)		(0.41)		(1.13)		(0.64)		(0.24)		(0.51)
Constant	90.65***	91.35***	91.04***	90.53***	88.50***	88.22***	95.32***	96.97***	93.05***	93.30***	96.28***	97.13***
	(0.84)	(0.63)	(0.35)	(0.42)	(0.96)	(0.72)	(0.38)	(0.60)	(0.56)	(0.52)	(0.92)	(0.93)
Observations	21	21	21	21	21	21	21	21	21	21	21	21
R-squared	0.92	0.93	0.98	0.98	0.92	0.93	0.93	0.79	0.96	0.95	0.60	0.44

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

We find that the estimated impacts are qualitatively similar in both cases, confirming that Sudden Stops should not only be a source of concern for Developing Countries; this notwithstanding, the quantitative effects are significantly larger on Developing Countries, with some variation depending on the type of Sudden Stop.

As discussed before, the Sudden Stop literature before the global financial crisis emphasized that the structural country characteristics that made some countries more prone to Sudden Stops were more prevalent in Developing Countries. However, one of the lessons of that crisis is that countries' vulnerabilities evolve over time, and that many Advanced Countries are suffering from financial and competitiveness problems reminiscent of past challenges in some Developing Countries.[21]

4.3 Which Flows Are the Most Disruptive?

It is possible that the composition of flows also matters for the impacts of Sudden Stops. This point has been stressed in the literature that has emphasized the potentially destabilizing role of Gross Capital Flows.[22] In particular, debt-creating Gross Capital Flows (i.e., bank flows) could be potentially more disruptive for financial stability than pure portfolio flows, or even FDI. This

[21] See, for example, Cavallo and Fernández-Arias (2012) for a discussion of the European crisis in light of previous Latin American experience.
[22] See, for example, Bruno and Shin (2012a and 2012b) and Shin (2012).

is so because the former lead to forced deleveraging in the context of a Sudden Stop. Rapid deleveraging, in turn, is usually hard to accommodate, and it may lead to banking crises.

In order to test whether certain types of flows are more disruptive than others, we aggregate the episodes by the subtype of flow that accounted for the largest share of the change. Therefore, for each of the 287 episodes in the sample, we assess which of the subcomponents of the Capital Flows (i.e., portfolio, foreign direct investment or other investments) accounted for the largest share of the change during the episode.

For example, in the case of SSI episodes, we distinguish among episodes in which the fall in Gross Capital Inflows was predominantly driven by: i) direct investment in the reporting economy (DIR); ii) portfolio investment liabilities (PIL); and iii) other investment liabilities (OIL), which are primarily loans from non-resident banks. In the case of Sudden Stops that were associated with Capital Outflows (SSO), we distinguish among episodes in which the surge was predominately explained by: i) direct investment abroad (DIA); ii) portfolio investment assets (PIA); and iii) other investment assets (OIA), which are primarily offshore deposits of residents or cross-border loans from resident banks. Finally, in the cases of Sudden Stops in Net Capital Flows, like SSIN, SSON, and SSION, in addition to separating the episodes by the underlying behavior of either Gross Inflows or Outflows, respectively, we also distinguish among the episodes in which the fall in Net Flows was explained by: i) net direct investment (DIN); ii) net portfolio investment (PIN); and iii) other investment liabilities (OIL).

Table 8 shows how each of the episodes is allocated within each bucket. For example, according to the table, there are 30 episodes in which the dominant flow driving the Sudden Stop was “portfolio investment assets” (PIA): 14 of these were SSO episodes; 10 were SSON episodes, and 6 were SSION episodes. There are 14 episodes in which the dominant flow was “direct investment assets” (DIA), and so on for each subcomponent of flows.

Table 8. Distribution of Different Types of Sudden Stops by Subtype of Flow

	Assets			Liabilities			Net			
	Portfolio	FDI	Other	Portfolio	FDI	Other	Portfolio	FDI	Other	Total
SSI	-	-	-	10	7	31	-	-	-	48
SSO	14	8	74	-	-	-	-	-	-	96
SSN	-	-	-	-	-	-	7	3	11	21
SSIN	-	-	-	10	6	41	13	5	39	57
SSON	10	5	22	-	-	-	16	5	16	37
SSION	6	1	19	3	2	21	4	0	22	26
Total	30	14	115	23	15	93	40	13	88	285

It stands out from the table that the episodes associated with changes in "other investments"—both assets (OIA), liabilities (OIL) and net (OIN)—account for the largest share of all episodes across all types of Sudden Stops.

Next, we assess the estimated impacts of each type of episodes on real GDP (Table 9). The results suggest that the episodes in which the predominating component was "other investment" are the most disruptive. In fact, in the cases of episodes driven by portfolio investments in particular, we do not find statistically significant disruptions in the aftermath of Sudden Stops. These results support the hypothesis that the composition of capital flows also matters. Irrespective of type, Sudden Stops that are predominantly driven by variations in "other investments" appear to be the most disruptive.

Table 9. The Estimated Effect of Different Types of Sudden Stops on Real GDP by Subtype of Flow

	Real GDP																	
	Assets						Liabilities						Net					
Dependent Variable	Portfolio Investment		Direct Investment		Other Invesment		Portfolio Investment		Direct Investment		Other Invesment		Portfolio Investment		Direct Investment		Other Invesment	
Trend	0.64***	0.65***	0.60***	0.67***	0.69***	0.66***	0.50***	0.48***	0.62***	0.47***	0.66***	0.43***	0.57***	0.56***	0.90***	0.75***	0.60***	0.38***
	(0.03)	(0.01)	(0.06)	(0.02)	(0.02)	(0.01)	(0.03)	(0.01)	(0.03)	(0.03)	(0.05)	(0.03)	(0.03)	(0.01)	(0.07)	(0.04)	(0.05)	(0.03)
Episode	0.06		0.92		-0.42**		-0.32		-2.08***		-3.19***		-0.15		-2.13**		-3.08***	
(1 if t>=0)	(0.31)		(0.71)		(0.20)		(0.42)		(0.44)		(0.61)		(0.25)		(0.95)		(0.70)	
Episode		-0.13		0.90***		-0.33***		0.71***		-1.20***		-0.39		0.17**		-2.28***		-0.14
(1 during episode)		(0.09)		(0.15)		(0.06)		(0.07)		(0.16)		(0.23)		(0.07)		(0.23)		(0.23)
Constant	93.0***	93.0***	92.0***	91.7***	92.9***	93.0***	94.0***	94.0***	95.4***	96.0***	94.8***	95.6***	93.6***	93.6***	93.4***	94.1***	95.2***	96.0***
	(0.17)	(0.15)	(0.30)	(0.23)	(0.11)	(0.09)	(0.18)	(0.11)	(0.24)	(0.34)	(0.25)	(0.41)	(0.18)	(0.16)	(0.46)	(0.42)	(0.30)	(0.44)
Observations	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21
R-squared	0.99	0.99	0.98	0.98	0.99	0.99	0.99	0.99	0.97	0.95	0.97	0.89	0.99	0.99	0.96	0.96	0.95	0.86

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

5. Conclusion

In this paper we have proposed a new taxonomy of Sudden Stops. We would argue that this framework integrates many of the varied contributions in the Sudden Stops literature and allows the researcher to then consider the different effects of different types of Sudden Stops, characterized by the behavior of Gross Capital Inflows and Outflows and Net Flows. Within that taxonomy two particular strands of the Sudden Stop literature can be clearly identified, which may be described as follows:

- *The Net Flows View*: This perspective emphasizes the potentially destabilizing role of abrupt falls in *Net* Capital Inflows. Sudden reversals in Net Capital Flows—irrespective of their origin—are frequently associated with real exchange rate depreciations and current account adjustments, which may be highly disruptive and provoke slowdowns in growth or even recession.
- *The Gross Flows View*: the focus here is on the role of *Gross* Capital Flows, in particular debt-creating flows like cross-border bank flows. Abrupt reversals in Gross Flows may be disruptive—in terms of output loss—even if they are not associated with an abrupt fall in Net Capital Inflows—because forced deleveraging in a short space of time can be destabilizing.

The taxonomy developed above illustrates how these two views may be distinct (SSI or SSO-type episodes versus SSN-type episodes) or overlapping (SSIN, SSON and SSION-type episodes). The literature to date has tended to focus on Sudden Stops in Net Flows (without always recognizing that some of those episodes might also be a Sudden Stop in Gross Inflows or Gross Outflows) or Sudden Stops in Gross Flows (without always recognizing that some of those may have an impact on Net Flows and some may not).

The Net Flows View, which proliferated in the aftermath of the emerging markets' crises of the 1990s, focused almost exclusively on a subset of Developing Countries (the so-called Emerging Economies). These were the countries that were perceived to be most vulnerable to Sudden Stops. However, the data analysis shows that Advanced Economies have also been susceptible to Sudden Stops. Before the global financial crisis, Advanced Economies suffered more from Gross Flow-type Sudden Stops and had relatively few Net Flow-type Sudden Stops. While there were several periods of sharp declines in the stocks of liabilities (Gross Inflow

Sudden Stops), these tended to be "financed" by a reduction in the stocks of assets held by residents abroad—a decline in outflows. The crisis, however, heralded a bunching of both Gross and Net Flow-type Sudden Stops in Advanced and in Developing Economies. In the current global environment the differences between Developing and Advanced Economies in terms of the pattern in capital flows appears to have narrowed. Capital flows in Advanced Economies have become more volatile, and Advanced Economies seem to be more vulnerable now to Sudden Stops in Net Capital Flows as well as Sudden Stops of the Gross Flow variety. It would appear that all countries may now wish to consider how to protect themselves against the deleterious effects of Net Flow and Gross Flow-type Sudden Stops.

Employing the taxonomy of Sudden Stops we then asked three specific questions. First, are all Sudden Stops in Net Capital Flows, whatever their origin, equally painful? The answer is NO. Second, can Sudden Stops in Gross Flows that are not simultaneously Sudden Stops in Net Flows also be painful? The answer is YES, but not all. Third, if so, what types of Sudden Stops in Gross Flows are the most painful? The answer is that Sudden Stops in Gross Inflows appear to be more disruptive than Sudden Surges in Gross Outflows. In fact, we find that Sudden Surges in Gross Capital Outflows are not associated with declines in real GDP at all.

Moreover, taking insights from both strands of the Sudden Stop literature, we have uncovered some interesting features in relation to the aftermath of different types of Sudden Stops. In particular, we have shown that: i) some Sudden Stops of Net Capital Flows are more disruptive than others; ii) episodes that are Sudden Stops in Net Capital Flows tend to have greater impacts on GDP; iii) episodes associated with drops in Gross Capital Inflows are more disruptive than episodes associated with surges in Gross Capital Outflows; and iv) some types of flows (i.e., bank flows) are more disruptive than others. Therefore, Sudden Stops that combine falls in Net Flows and that are driven by an abrupt reduction in bank inflows appear to be the most disruptive combination.

Our results also raise a few puzzles and suggest new avenues for research and future policy analysis. For example, it is not clear why a Sudden Surge in Outflows that was also a Net Flow Sudden Stop (i.e., SSON) would not be associated with a significant real depreciation and would be less disruptive than a Sudden Stop in Inflows that was also a Net Flow-type Sudden Stop (i.e., SSIN). One answer might be that such periods of capital flight tend to be financed by a fall in reserves, but that in turn begs the question of why that would be the case: if a Sudden

Stop in Capital Inflows that was also a Net Flow Sudden Stop is disruptive, why would countries not attempt to "finance" those Sudden Stops through reserve reduction? Future work might also consider movements in reserves, again employing the taxonomy developed above to attempt to answer this question.

The answer may also relate to how reserves might be used to ameliorate the costs of Sudden Stops. On the one hand, a significant buffer of reserves might be preventative in nature and give investors more confidence in maintaining investments in the country under consideration. But if the Sudden Stop does occur, a question is how might reserves be used most effectively to reduce economic disruption? Have countries found more effective ways to use reserves for Sudden Surges in Outflows compared to Sudden Stops in Inflows, and if so, what are these mechanisms?

Apart from having a large buffer of reserves, many developing countries have also attempted to improve their balance sheets by lengthening sovereign debt maturities, issuing more debt locally and in local currency and, in general, reducing currency or maturity mismatches. An interesting topic for future research is how such advances might reduce the costs of different types of Sudden Stops. The data show that not all Sudden Stops, even of the same type, incur the same costs. For those most painful of Sudden Stops (SSION and SSIN), does improvement in balance sheets reduce economic disruption? Recent papers have indicated that emerging economy sovereigns have been paying higher effective ex post interest costs issuing debt locally, compared to interest rates paid on external debt in dollars.[23] One interpretation is that countries have been buying insurance against Sudden Stops. Has this been effective, and if so, has it been effective for all types of painful Sudden Stops or only some types? One concern, for example, is that while emerging economy sovereign balance sheets have improved, private balance sheets may actually have deteriorated in the sense that booming non-tradable sectors in countries that are large recipients of capital inflows (several of which are also commodity exporters) may have been issuing significant amounts of foreign currency debt.

Another question that emerges from the preceding analysis is why are Sudden Stops in inflows more disruptive than Sudden Surges in outflows? This is true for both Gross Flows episodes only (i.e., SSI versus SS0) and for Net episodes (SSIN versus SSON). It may be that

[23] See Aizenman and Pasricha (2013) on the costs of domestic versus external debt in emerging economies, comparing the last decade with previous periods.

countries have found more effective ways to backstop abrupt changes in the stock of foreign asset holdings of residents (i.e., through controls on capital outflows) than to have access to external liquidity sources to finance an abrupt reduction in Gross Capital Inflows? Moreover, this distinction also underscores the importance of international liquidity assistance via an international lender of last resort, particularly during episodes of Sudden Stops in Inflows.[24]

The taxonomy and data analysis also underscores that Sudden Stops are not only a phenomenon pertaining to developing countries. Our results may help to explain why the impacts of the global financial crisis have been so pervasive in economies that were not previously considered to be at high risk of Net Flow-type Sudden Stops. It seems that several Advanced Economies suffered Net Flow-type Sudden Stops, hence it may be necessary for them to make significant real exchange rate adjustments to adjust to the reality of lower Net Capital Inflows. They may also need to take precautions against the potential consequences of a Gross Flow Sudden Stop and its counterpart of deleveraging. How Advanced Economies can protect themselves in the future against such episodes at minimum cost is surely also a critical topic of future research.

We hope that the new taxonomy serves as an organizing framework which can be taken to deepen the analysis on the macroeconomic impacts of different types of shocks. We have uncovered some heterogeneity amongst the different types of Sudden Stops; further research is required, however, to pin down the exact sources and defining characteristics of that heterogeneity.

[24] On the need for an international lender of last resort see Fischer (1999), Arozamena and Powell (2003) and Calvo (2005).

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Appendix

1. Sample

Table A. 1. Sample of Countries and Time Span of Data Coverage

Developing Countries						Advanced Economies					
Country	Start	End	Country	Start	End	Country	Start	End	Country	Start	End
Argentina	1980q1	2011q4	Lithuania	1995q1	2012q2	Australia	1980q1	2010q4	Korea, Republic of	1988q1	2012q3
Belarus	1997q1	2012q2	Malaysia	1999q1	2009q4	Austria	1980q1	2012q3	Malta	1995q1	2012q3
Belize	2001q1	2011q4	Mexico	2001q1	2012q3	Canada	1980q1	2012q2	Netherlands	1980q1	2012q3
Brazil	1980q1	2011q4	Pakistan	1980q1	2011q3	Cyprus	2001q1	2012q2	New Zealand	1989q2	2012q2
Bulgaria	1992q1	2012q2	Panama	1998q1	2011q3	Czech Republic	1993q1	2012q3	Norway	1980q1	2012q3
Chile	1991q1	2011q3	Peru	1991q1	2011q3	Denmark	1985q1	2012q3	Portugal	1980q2	2012q2
Colombia	1996q1	2011q4	Philippines	1980q1	2011q4	Estonia	1993q3	2012q3	Singapore	1995q1	2012q3
Costa Rica	1999q1	2012q1	Poland	1985q1	2011q4	Finland	1980q1	2012q2	Slovak Republic	1993q2	2011q4
Croatia	1993q1	2011q4	Romania	1991q1	2012q2	France	1980q1	2011q4	Slovenia	1992q1	2012q3
Ecuador	1993q1	2011q1	Russia	1994q1	2011q4	Germany	1980q1	2011q4	Spain	1980q1	2011q4
El Salvador	1999q1	2011q3	South Africa	1988q2	2012q3	Greece	1999q1	2012q3	Sweden	1980q1	2011q4
Georgia	1997q1	2011q4	Thailand	1980q1	2011q3	Hong Kong	1999q1	2012q2	Switzerland	1999q1	2012q3
Hungary	1989q4	2012q2	Turkey	1984q1	2012q3	Iceland	1991q1	2012q3	United Kingdom	1980q1	2011q4
Indonesia	1981q1	2011q4	Uruguay	2000q1	2010q4	Ireland	1990q1	2012q2	United States	1980q1	2011q4
Jordan	1980q1	2011q4	Venezuela	1994q1	2011q4	Israel	1980q2	2012q3			
Kazakhstan	1995q1	2011q4				Italy	1980q1	2012q3			
Latvia	1996q1	2012q3				Japan	1980q1	2011q4			

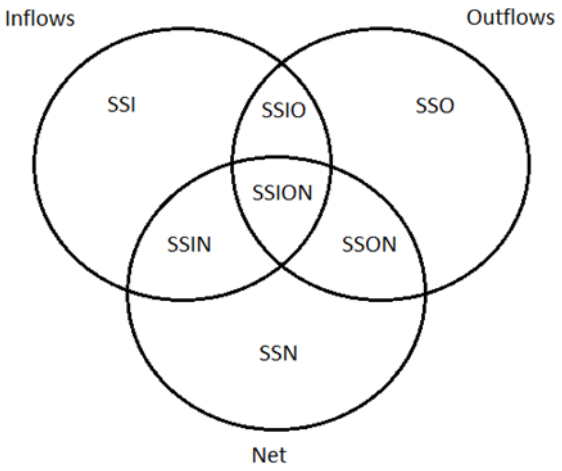
2. A Complete Taxonomy of Sudden Stops

Figure A.1 summarizes the full taxonomy of episodes.[25] Let us begin with the Gross Inflows circle ("Inflows"). Episodes within this circle are Sudden Stops in Gross Inflows because for each of them there was a sufficiently large drop in Gross Capital Inflows according to the Calvo, Izquierdo and Mejía (2004) algorithm. Moreover, there are three subtypes of episodes that share the same origin:

1. Sudden Stops in Gross Inflows (SSI)
2. Sudden Stops in Gross and Net Inflows (SSIN)
3. Sudden Stops in Gross and Net Inflows plus Sudden Starts in Gross Outflows (SSION)

[25] Note that SSIO in Figure A.1. is an empty set because there cannot not be cases with simultaneously large drops in Gross Inflows and large Surges in Gross Outflows that do not result in a significant drop in Net Capital Flows.

Figure A. 1. A Taxonomy of Sudden Stops



Hence, only a subset of the Gross Inflows circle is simultaneously Sudden Stops according to the Gross and Net Flows criterion. The difference between the subtypes of episodes hinges on the concurrent behavior of Gross Outflows. In the case of SSION, in addition to the Sudden Stop in Gross Inflows, there was concurrently a Sudden Start in Gross Outflows which reinforced the impact of the latter on Net Flows. Instead, in the case of SSI, the drop in Gross Inflows was accompanied by an offsetting change in the Gross Outflows (i.e., capital repatriation) such that Net Flows did not change much.

In the case of Gross Outflows ("Outflows" circle in Figure A.1.), the pattern is similar. All the episodes within this circle are Sudden Starts in Gross Outflows because, for each of them, there was a sufficiently large increase in Gross Outflows. However, there are also three subtypes of episodes of this kind. One of them is (SSION), which was already defined because it is also part of the Gross Inflows circle. The other two are:

4. Sudden Starts in Gross Outflows (SSO)
5. Sudden Starts in Gross Outflows and Sudden Stops in Net Flows (SSON).

The difference between these subtypes hinges on the concurrent behavior of gross capital inflows. In particular, SSO are not SSON because the surge in Gross Outflows was accompanied by an offsetting increase in Gross Inflows such that Net Flows remained stable.

Finally the circle labeled "Net" in Figure A.1. comprises the full set of Sudden Stops as defined in the Net Sudden Stops literature. Our contribution is that, given that we apply the Calvo et al. algorithm to the series of Gross Inflows and Gross Outflows, we can disaggregate Net Sudden Stops into four distinct subtypes of episodes: SSN, SSIN, SSION and SSON depending on their origin. We have already discussed all of them, except for SSN episodes.

6. Sudden Stop in Net Flows (SSN)

SSN episodes are such that there is simultaneously a mild fall in Gross Inflows that is reinforced by a mild surge in Gross Outflows. While neither change in the underlying Gross Flows is individually large enough to trespass the threshold of the Calvo, Izquierdo and Mejía (2004) algorithm, the combination of the two results in a large enough drop in Net Flows such that the event qualifies as a Sudden Stop according to the Calvo, Izquierdo and Mejía (2004) criterion.

3. Incidence of Sudden Stops

Table A.2 summarizes the incidence of each type of episode in the sample.

Table A. 2. Summary of Frequency Distribution Episodes by Type

Type of Event	All Countries	Advanced Economies		Developing Countries	
		Before 2000	After 2000	Before 2000	After 2000
Inflows	**131**	**38**	**55**	**14**	**24**
SSI	37%	50%	42%	7%	21%
SSIN	44%	47%	27%	71%	58%
SSION	20%	3%	31%	21%	21%
Outflows	**159**	**50**	**56**	**18**	**35**
SSO	60%	82%	38%	67%	63%
SSON	23%	16%	32%	17%	23%
SSION	16%	2%	30%	17%	14%
Net	**141**	**35**	**58**	**19**	**29**
SSN	15%	23%	14%	16%	7%
SSIN	40%	51%	26%	53%	48%
SSON	26%	23%	31%	16%	28%
SSION	18%	3%	29%	16%	17%

Episodes associated with Sudden Starts in *Gross Capital Outflows* are slightly more frequent than Sudden Stops in *Gross Capital Inflows* and *Sudden Stops in Net Capital Flows.* In fact, out of the 285 episodes, 159 of them (i.e., 56 percent) are either "SSO, SSON or SSION" (i.e., they belong to the "Outflows" circle); compared to 131 (i.e., 46 percent) that are either "SSI, SSIN, or SSION" (i.e. belong to the "Inflows" circle), and 141 (i.e., 50 percent) that are either "SSN, SSIN, SSON, or SSION" (i.e., belong to the "Net" circle).

However, episodes originating in *Sudden Start in Gross Capital Outflows* overlap less with *Net* Sudden Stops than the episodes originating in Sudden Stops in Gross Capital Inflows. In fact, out of the 159 episodes in the circle labeled "Outflows," only 39 percent are either "SSON or SSION." Instead, 64 percent of the episodes that comprise the circle labeled "Inflows" are either "SSIN or SSION."

Therefore, these results suggest that Sudden Stops in *Net Capital Flows* are more likely to originate in (less frequent) Sudden Stops in Gross Inflows, than in (more frequent) Sudden Starts in Gross Outflows.

Finally, it is noteworthy that episodes "SSN"—i.e., episodes of Sudden Stops in *Net Capital Flows* that are not triggered by either large drops in Gross Capital Inflows or large Surges in Gross Capital Outflows—are relatively less common in the sample (less than 8 percent of episodes are "SSN"). This suggests that Sudden Stops in Net Capital Flows are more commonly associated with abrupt movements in Gross Flows, rather than in milder but reinforcing Gross Flows gyrations.

4. Treatment of Simultaneous Episodes

An episode of any type begins when Gross Inflows, Gross Outflows or Net Flows fall below one standard deviation of the historical mean (conditional that it subsequently falls below two standard deviations below the mean) and ends when the series exceeds one standard deviation below the mean (see Figure 2 in Section 3.1).

For episodes that involve only one type of flow (i.e., SSI, SSO and SSN), the start and the end of the episodes are determined only by the behavior of the corresponding flow. On the other hand, for episodes that involve more than one type of flow (i.e., SSIN, SSON, and SSION), the episode window is more complicated.

For concreteness, we define the episode window as the quarters when the abovementioned condition is met simultaneously for the various types of flows. In particular:

1. Determine the episode window for each type of flow separately (i.e., Inflow, Outflow or Net).
2. A Sudden Stop episode (i.e. SSIN, SSON or SSION) occurs only during quarters when there is simultaneously an episode of Gross Inflows, Gross Outflows and/or Net flows.
3. The non-overlapping parts of the episodes in (1) are not considered as a part of the same Sudden Stop episode.

For example, consider a case in which an episode of Gross Inflows starts at quarter *t* with a duration of 4 quarters (until *t+3*); and an episode of Net starts at *t+1* with a duration of 3 quarters (until *t+3*). The episode will be an SSIN during 3 quarters (*t+1*, *t+2* and *t+3*); in order to avoid duplication, we will not consider the first part of the Inflows episode (in *t*). We follow this same process for episodes that involve the three flows concurrently (i.e., SSION).

Time	Inflows	Outflows	Net	Episode
t	1	0	0	-
t+1	1	0	1	SSIN
t+2	1	0	1	SSIN
t+3	1	0	1	SSIN
t+4	0	0	0	-

It is also possible that one episode coincides with two other flows, but not simultaneously. In that case we will consider it as two different Sudden Stop episodes. For example, consider a case in which an episode of Net starts at quarter *t* with a duration of 8 quarters (until *t+7*); at *t*+1 an episode of Inflows starts that lasts 3 quarters (*t+3*); finally an episode of Outflows starts at *t+6* with duration of 4 quarters. We will consider this as an SSIN episode between t+1 and t+3; and an SSON event between *t+6* and *t+7*.

Time	Inflows	Outflows	Net	Episode
t	0	0	1	-
t+1	1	0	1	SSIN
t+2	1	0	1	SSIN
t+3	1	0	1	SSIN
t+4	0	0	1	-
t+5	0	0	1	-
t+6	0	1	1	SSON
t+7	0	1	1	SSON
t+8	0	1	0	-
t+9	0	1	0	-
t+10	0	0	0	-

5. Additional Results

5.1 Figures

Figure A.2. The Behavior of Real GDP by Type of Sudden Stop

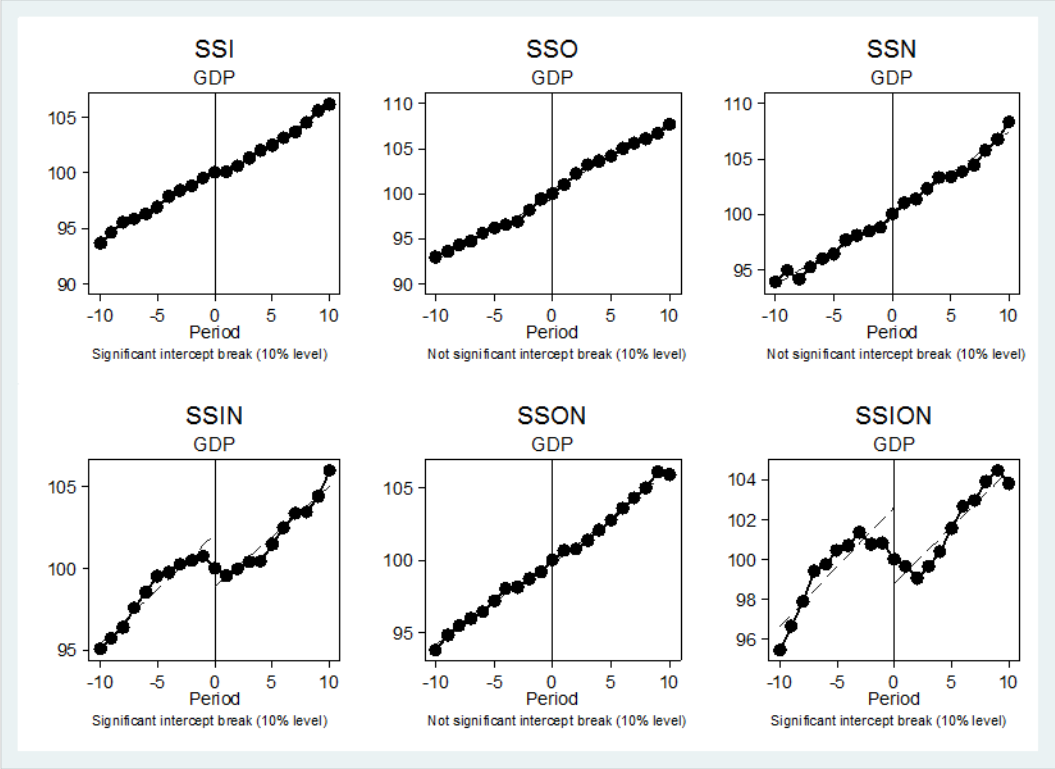


Figure A. 1. The Behavior of the Real Exchange Rate by Type of Sudden Stop

5.2 Regressions

Table A. 3. The Estimated Effect on Real GDP of SSI-Type of Sudden Stop

	Real GDP					
	SSI					
Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)
Trend	0.63***	0.59***	0.54***	0.50***	0.53***	0.49***
	(0.02)	(0.01)	(0.04)	(0.04)	(0.04)	(0.04)
Episode	-0.68**		-0.57		-0.53*	
(1 if t>=0)	(0.26)		(0.36)		(0.31)	
Episode		-0.34*		-0.39		-0.49*
(1 during episode)		(0.17)		(0.26)		(0.29)
Change in Inflows (fall in sd)					-0.11	-0.092
					(0.15)	(0.15)
Change in Outflows (surge in sd)					-0.11	-0.12
					(0.14)	(0.14)
Change in Net flows (fall in sd)					0.07	0.08
					(0.16)	(0.16)
Constant	93.2***	93.5***	100***	100***	133***	133***
	(0.15)	(0.13)	(0.31)	(0.29)	(0.31)	(0.31)
Episode Fixed Effect & cluster	No	No	Yes	Yes	Yes	Yes
Observations	21	21	986	986	980	980
R-squared	0.99	0.99	0.98	0.98	0.98	0.98

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table A. 4. The Estimated Effect on Real GDP of SSO-Type of Sudden Stop

Real GDP						
	SSO					
Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)
Trend	0.70***	0.76***	0.59***	0.65***	0.65***	0.67***
	(0.03)	(0.01)	(0.05)	(0.04)	(0.05)	(0.04)
Episode	1.00**		0.89***		0.19	
(1 if t>=0)	(0.41)		(0.28)		(0.39)	
Episode		0.34		0.26		-0.45
(1 during episode)		(0.21)		(0.22)		(0.36)
Change in Inflows (fall in sd)					-0.37**	-0.39**
					(0.16)	(0.16)
Change in Outflows (surge in sd)					0.02	0.07
					(0.15)	(0.16)
Change in Net flows (fall in sd)					0.01	0.01
					(0.21)	(0.21)
Constant	92.0***	91.7***	114***	114***	114***	114***
	(0.15)	(0.19)	(0.28)	(0.26)	(0.29)	(0.26)
Episode Fixed Effect & cluster	No	No	Yes	Yes	Yes	Yes
Observations	21	21	1791	1791	1769	1769
R-squared	0.99	0.99	0.97	0.97	0.97	0.97

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table A. 5. The Estimated Effect on Real GDP of SSN-Type of Sudden Stop

Real GDP						
	SSN					
Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)
Trend	0.68***	0.69***	0.55***	0.57***	0.48***	0.56***
	(0.05)	(0.03)	(0.09)	(0.08)	(0.08)	(0.07)
Episode	0.21		0.27		1.15*	
(1 if t>=0)	(0.41)		(0.48)		(0.64)	
Episode		-0.08		-0.05		0.90
(1 during episode)		(0.18)		(0.55)		(0.56)
Change in Inflows (fall in sd)					0.11	0.18
					(0.39)	(0.42)
Change in Outflows (surge in sd)					0.25	0.31
					(0.35)	(0.37)
Change in Net flows (fall in sd)					-0.50*	-0.59*
					(0.27)	(0.31)
Constant	92.6***	92.6***	107***	106***	39.8***	88.4***
	(0.35)	(0.29)	(0.77)	(0.68)	(0.89)	(0.90)
Episode Fixed Effect & cluster	No	No	Yes	Yes	Yes	Yes
Observations	21	21	414	414	400	400
R-squared	0.99	0.99	0.98	0.98	0.98	0.98

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table A. 6. The Estimated Effect on Real GDP of SSIN-Type of Sudden Stop

	Real GDP					
	SSIN					
Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)
Trend	0.64***	0.42***	0.57***	0.36***	0.54***	0.38***
	(0.05)	(0.03)	(0.08)	(0.07)	(0.07)	(0.08)
Episode	-3.15***		-2.99***		-2.28***	
(1 if t>=0)	(0.61)		(0.62)		(0.70)	
Episode		-0.98**		-1.32***		-0.08
(1 during episode)		(0.35)		(0.43)		(0.62)
Change in Inflows (fall in sd)					-0.29	-0.33
					(0.19)	(0.21)
Change in Outflows (surge in sd)					-0.10	-0.08
					(0.18)	(0.19)
Change in Net flows (fall in sd)					-0.02	-0.11
					(0.17)	(0.19)
Constant	94.9***	95.8***	98.1***	99.1***	98.0***	98.6***
	(0.31)	(0.44)	(1.37)	(1.40)	(1.37)	(1.44)
Episode Fixed Effect & cluster	No	No	Yes	Yes	Yes	Yes
Observations	21	21	1101	1101	1092	1092
R-squared	0.96	0.89	0.96	0.96	0.96	0.96

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table A. 7. The Estimated Effect on Real GDP of SSON-Type of Sudden Stop

	Real GDP					
	SSON					
Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)
Trend	0.62***	0.60***	0.57***	0.56***	0.59***	0.56***
	(0.02)	(0.01)	(0.07)	(0.09)	(0.07)	(0.08)
Episode	-0.34		-0.15		-0.30	
(1 if t>=0)	(0.26)		(0.53)		(0.57)	
Episode				0.10		0.02
(1 during episode)		0.03		(0.47)		(0.59)
Change in Inflows (fall in sd)		(0.08)			-0.26	-0.25
					(0.33)	(0.33)
Change in Outflows (surge in sd)					-0.09	-0.09
					(0.28)	(0.28)
Change in Net flows (fall in sd)					0.09	0.07
					(0.23)	(0.23)
Constant	93.4***	93.4***	95.4***	95.4***	103***	103***
	(0.14)	(0.12)	(0.68)	(0.75)	(0.76)	(0.92)
Episode Fixed Effect & cluster	No	No	Yes	Yes	Yes	Yes
Observations	21	21	713	713	712	712
R-squared	0.99	0.99	0.93	0.93	0.93	0.93

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table A. 8. The Estimated Effect on Real GDP of SSION-Type of Sudden Stop

Real GDP						
	SSION					
Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)
Trend	0.58***	0.32***	0.67***	0.38**	0.64***	0.38**
	(0.07)	(0.04)	(0.15)	(0.15)	(0.16)	(0.15)
Episode	-3.74***		-4.31***		-3.71***	
(1 if t>=0)	(0.82)		(1.10)		(1.14)	
Episode		-1.50***		-2.57***		-0.82
(1 during episode)		(0.48)		(0.61)		(1.46)
Change in Inflows (fall in sd)					-0.26	-0.34
					(0.38)	(0.50)
Change in Outflows (surge in sd)					0.11	-0.08
					(0.30)	(0.36)
Change in Net flows (fall in sd)					-0.16	-0.05
					(0.43)	(0.47)
Constant	96.2***	97.3***	63.1***	63.8***	62.8***	63.7***
	(0.47)	(0.62)	(2.44)	(2.50)	(2.58)	(2.69)
Episode Fixed Effect & cluster	No	No	Yes	Yes	Yes	Yes
Observations	21	21	521	521	521	521
R-squared	0.89	0.77	0.93	0.93	0.93	0.93

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table A. 9. The Estimated Effect on the Real Exchange Rate of SSI-Type of Sudden Stop

Real Exchange Rate						
	SSI					
Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)
Trend	-0.060*	-0.10***	-0.045	-0.095	-0.069	-0.088
	(0.03)	(0.01)	(0.09)	(0.10)	(0.10)	(0.10)
Episode	-0.64*		-0.75		-0.28	
(1 if t>=0)	(0.37)		(0.57)		(0.79)	
Episode		-0.64***		-0.53		-0.096
(1 during episode)		(0.08)		(0.59)		(0.82)
Change in Inflows (fall in sd)					-0.044	-0.047
					(0.39)	(0.39)
Change in Outflows (surge in sd)					0.16	0.17
					(0.37)	(0.37)
Change in Net flows (fall in sd)					0.42	0.42
					(0.35)	(0.35)
Constant	101***	102***	105***	105***	104***	104***
	(0.17)	(0.14)	(0.68)	(0.71)	(0.76)	(0.70)
Episode Fixed Effect & cluster	No	No	Yes	Yes	Yes	Yes
Observations	21	21	950	950	944	944
R-squared	0.81	0.88	0.68	0.68	0.68	0.68

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table A. 10. The Estimated Effect on the Real Exchange Rate of SSO-Type of Sudden Stop

Real Exchange Rate						
	SSO					
Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)
Trend	-0.27	-0.087	-0.11	-0.0074	-0.15	0.0013
	(0.35)	(0.18)	(0.14)	(0.11)	(0.17)	(0.11)
Episode	2.42		1.27		2.02	
(1 if t>=0)	(2.78)		(0.93)		(1.32)	
Episode		-1.63**		-0.80		-0.32
(1 during episode)		(0.77)		(0.61)		(0.67)
Change in Inflows (fall in sd)					-0.74	-0.74
					(0.65)	(0.65)
Change in Outflows (surge in sd)					-0.83	-0.68
					(0.62)	(0.56)
Change in Net flows (fall in sd)					0.32	0.30
					(0.41)	(0.40)
Constant	104***	104***	124***	124***	102***	102***
	(3.18)	(2.75)	(1.05)	(1.00)	(1.86)	(1.61)
Episode Fixed Effect & cluster	No	No	Yes	Yes	Yes	Yes
Observations	21	21	1723	1723	1705	1705
R-squared	0.07	0.07	0.48	0.48	0.49	0.48

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table A. 11. The Estimated Effect on the Real Exchange Rate of SSN-Type of Sudden Stop

Real Exchange Rate						
	SSN					
Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)
Trend	-0.010	0.080*	-0.026	0.042	-0.026	0.045
	(0.08)	(0.04)	(0.14)	(0.14)	(0.15)	(0.14)
Episode	1.29		1.13		1.00	
(1 if t>=0)	(0.76)		(0.82)		(1.03)	
Episode		0.56		1.80**		1.71
(1 during episode)		(0.40)		(0.63)		(1.04)
Change in Inflows (fall in sd)					-0.63	-0.44
					(0.42)	(0.41)
Change in Outflows (surge in sd)					-0.16	-0.015
					(0.38)	(0.40)
Change in Net flows (fall in sd)					0.33	0.069
					(0.26)	(0.31)
Constant	99.4***	99.0***	96.6***	95.8***	73.1***	72.2***
	(0.55)	(0.38)	(1.31)	(1.33)	(1.99)	(2.10)
Episode Fixed Effect & cluster	No	No	Yes	Yes	Yes	Yes
Observations	21	21	396	396	380	380
R-squared	0.30	0.24	0.77	0.78	0.73	0.73

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table A. 12. .The Estimated Effect on the Real Exchange Rate of SSIN-Type of Sudden Stop

Real Exchange Rate						
	SSIN					
Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)
Trend	0.063	-0.15***	0.040	-0.15	-0.025	-0.13
	(0.05)	(0.03)	(0.14)	(0.14)	(0.15)	(0.14)
Episode	-3.03***		-2.77**		-1.46	
(1 if t>=0)	(0.57)		(1.24)		(1.20)	
Episode		-1.07***		-1.46		0.45
(1 during episode)		(0.23)		(1.28)		(1.22)
Change in Inflows (fall in sd)					-0.41	-0.45
					(0.72)	(0.73)
Change in Outflows (surge in sd)					-0.16	-0.13
					(0.69)	(0.69)
Change in Net flows (fall in sd)					-0.19	-0.27
					(0.45)	(0.45)
Constant	102***	103***	101***	102***	123***	123***
	(0.36)	(0.55)	(1.16)	(1.29)	(1.91)	(1.99)
Episode Fixed Effect & cluster	No	No	Yes	Yes	Yes	Yes
Observations	21	21	931	931	922	922
R-squared	0.81	0.57	0.81	0.81	0.80	0.80

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table A. 13. The Estimated Effect on the Real Exchange Rate of SSON-Type of Sudden Stop

Real Exchange Rate						
	SSON					
Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)
Trend	-0.064	-0.065***	-0.089	-0.086	-0.056	-0.062
	(0.04)	(0.02)	(0.18)	(0.15)	(0.18)	(0.15)
Episode	-0.0086		0.057		-0.068	
(1 if t>=0)	(0.50)		(1.20)		(1.29)	
Episode		-0.099		0.43		0.33
(1 during episode)		(0.31)		(0.97)		(1.41)
Change in Inflows (fall in sd)					0.23	0.23
					(0.44)	(0.44)
Change in Outflows (surge in sd)					0.81*	0.80
					(0.46)	(0.49)
Change in Net flows (fall in sd)					-0.67	-0.69
					(0.42)	(0.41)
Constant	100***	100***	101***	101***	107***	107***
	(0.28)	(0.26)	(1.42)	(1.37)	(1.34)	(1.28)
Episode Fixed Effect & cluster	No	No	Yes	Yes	Yes	Yes
Observations	21	21	641	641	640	640
R-squared	0.35	0.35	0.71	0.71	0.72	0.72

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table A. 14. The Estimated Effect on the Real Exchange Rate of SSION-Type of Sudden Stop

Real Exchange Rate						
	SSION					
Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)
Trend	-0.10*	-0.38***	-0.024	-0.32	0.13	-0.31
	(0.05)	(0.04)	(0.21)	(0.26)	(0.21)	(0.26)
Episode	-4.04***		-4.08*		-5.83***	
(1 if t>=0)	(0.54)		(2.31)		(1.98)	
Episode		-1.45***		0.62		1.64
(1 during episode)		(0.28)		(0.97)		(1.74)
Change in Inflows (fall in sd)					0.96*	0.56
					(0.49)	(0.44)
Change in Outflows (surge in sd)					1.21***	0.68*
					(0.37)	(0.37)
Change in Net flows (fall in sd)					-1.44*	-1.16
					(0.70)	(0.70)
Constant	104***	106***	134***	135***	133***	135***
	(0.38)	(0.62)	(2.06)	(2.36)	(2.09)	(2.37)
Episode Fixed Effect & cluster	No	No	Yes	Yes	Yes	Yes
Observations	21	21	429	429	429	429
R-squared	0.96	0.85	0.68	0.67	0.69	0.68

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1