Capital Flows to Latin America in the Aftermath of the Commodities Super-Cycle[1]

Countries in Latin America and the Caribbean (LAC) rely on volatile capital inflows to finance investment, which poses important challenges. After the end of the commodity super cycle in 2014, capital flows to the region have declined and their composition has become riskier, with a larger prominence of portfolio flows. Moreover, the sensitivity of capital inflows to global financial conditions and growth differentials has increased in recent years, increasing the likelihood of a sudden stop in capital flows if growth in the region continues to falter and global financial conditions tighten. The analysis in this chapter shows that countries with floating exchange rate regimes tend to experience shorter and less costly sudden stops in capital flows, while a tightening of monetary policy following a sudden stop episode is also associated with a reduction in the duration of sudden stops and the ensuing deceleration in growth. Tighter capital controls, however, do not have statistically significant effects on the duration of sudden stops.

Introduction

Capital flows enable growth when domestic savings are insufficient to finance investment (capital accumulation channel) and when they bring technological and managerial improvements along with them (productivity channel). These two factors are particularly relevant for countries in LAC as: (i) domestic savings are low relative to investment, and (ii) productivity growth has been persistently weak (see October 2018 *Regional Economic Outlook: Western Hemisphere*).

Notwithstanding these benefits, there are also challenges. Volatile capital flows can disrupt the domestic economy during difficult times, or fuel overheating and asset price bubbles in boom periods (Araujo et al., 2017a, Prasad, Rajan, and Subramanian, 2007). Policymakers should have a framework in place to manage the effects of capital flow surges and reversals, particularly in the current context of high global uncertainty.

This chapter reviews recent trends in capital flows to LAC and explores policy options to mitigate the adverse effects of their boom-bust pattern. It first presents evidence on the insufficient domestic savings to finance investment, and then analyzes the behavior of different categories of capital flows in the last decade as well as their drivers. The nature and determinants of flows have changed relative to the dominant role played by flows to the commodity sector during the commodity super-cycle, as analyzed in chapter 3 of the 2017 REO. In addition, the chapter discusses the determinants of and risks posed by sudden stops, and explores policy options to deal with them

The Low Savings, Low Investment Problem in LAC

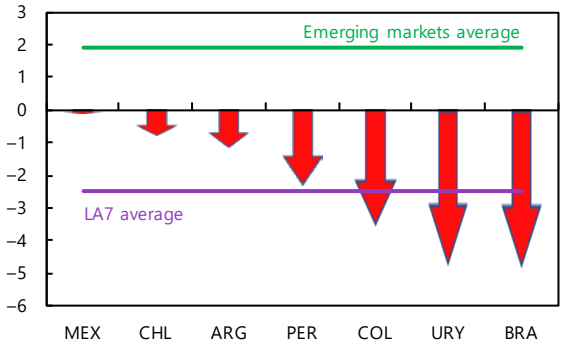
Investment and savings are lower in LAC than in other emerging market economies (EMEs), but the savings gap is larger (Goncalves, 2018). Investment and savings in LAC averaged 22 and 18 percent of GDP during 2000–17, respectively. This is about 4 and 6.5 percentage points of GDP lower than the average of other EMEs. Domestic savings in LAC are low even after controlling by structural factors. Figure 1 shows the residuals from a regression of savings rates on income levels and the share of working

[1]This chapter was prepared by Carlos Gonçalves, Antonio David, and Samuel Pienknagura. The authors appreciate the superb research assistance by Genevieve Lindow and Pablo Bejar and the literature review by Jaime Leyva.

age population for a sample of 160 EMEs during 2000–17. A positive (negative) residual means higher (lower) savings than predicted by the model. For LAC, the residuals are on average negative, especially for Brazil, Colombia, and Uruguay, implying lower savings rates than justified by the region's income levels and demographic characteristics.

Access to foreign financing has allowed the region to partly overcome its savings deficit, especially when investment has expanded rapidly. For example, the investment-to-GDP ratio expanded rapidly in some countries in LAC during the commodity boom. At the same time, domestic savings did not keep pace and the current account deficit (external financing) increased (see Box 1 on the April 2015 *Regional Economic Outlook: Western Hemisphere*, and Goncalves, 2018).

Figure 1. LAC's Low Saving Problem
(Savings rate deviation from model; percent of GDP; 2000 onwards)



Source: IMF staff calculations.
Note: Data labels use International Organization for Standardization (ISO) country codes. LAC = Latin America and the Caribbean; LA7 = Argentina, Brazil, Chile, Colombia, Mexico, Peru, Uruguay.

The data also shows that capital inflows and investment are highly correlated in LAC, but not so much in other EMEs (Annex 1). Real investment growth in EMEs tends to accelerate in periods of strong capital inflows, but the size and significance of the accelerations vary across countries and periods. For the average EME, investment growth raises by 1.7 percentage points after a capital flow surge, but the effect is not statistically significant. In contrast, the LAC countries experience an 11 percentage points increase in investment growth.

Reliance on external financing, however, is not free of risks and challenges. Capital flows are volatile and can dry-up when countries are going through difficult times (Kaminsky, Reinhart, and Vegh, 2005). Moreover, the composition of capital flows may matter for both its benefits and risks. For example, foreign direct investment (FDI) flows are associated with larger potential for productivity improvements, especially when they lead to linkages between foreign firms and the domestic economy. In contrast, portfolio flows are generally more volatile. In light of this, the next two sections study recent trends in capital flows into LAC and the factors that shape these trends.

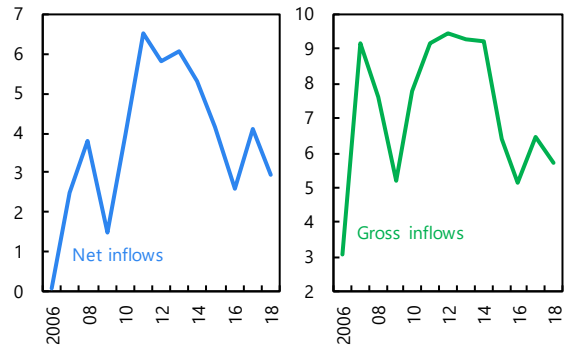
Portfolio Flows Take Center Stage

Capital flows to LAC declined in the aftermath of the commodities boom (Figure 2, panel 1). Net capital flows to the region recovered strongly after the Global Financial Crisis (GFC), remaining high at around 5 percent of GDP in 2010–14.[2] However, they declined to around 3 percent of GDP since 2014, after the boom in commodity prices came to an end. Most of this fall was driven by lower gross capital inflows, which were only partly offset by lower gross capital outflows. More generally, gross capital inflows to LAC are much larger than gross capital outflows, and thus account for most of the variation in net capital flows. Hence, the remainder of the section focuses on recent developments in gross capital inflows.

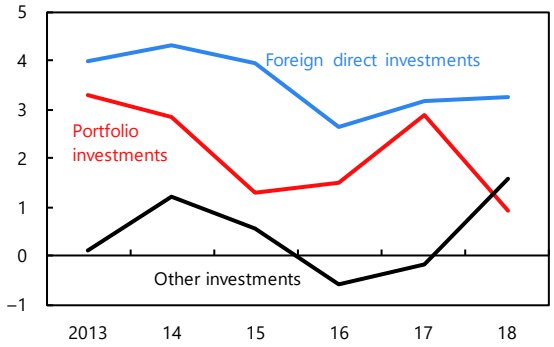
[2]Net capital flows are defined as difference between gross capital inflows (net incurrence of liabilities by domestic residents) and gross capital outflows (net acquisition of foreign assets by domestic residents).

Figure 2. Capital Inflows to the Region
(Percent of GDP)

1. Net and Gross Inflows



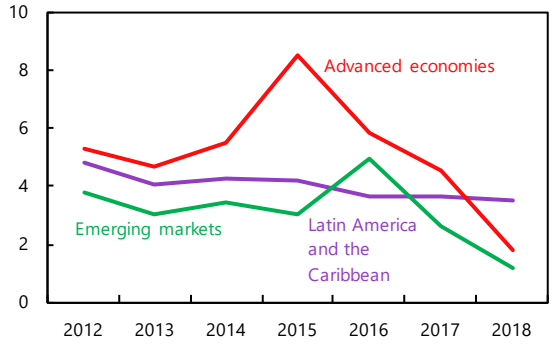
2. Types of Inflows to LA7



Sources: IMF, Financial Flows Analytics database; and IMF staff calculations.
Note: LA7 = Argentina, Brazil, Chile, Colombia, Mexico, Peru, Uruguay.

Regarding the different categories of flows, most of the fall in gross capital inflows to the LA7 countries since 2013 was driven by portfolio flows (Figure 2, panel 2). Gross portfolio inflows fell by 2 percentage points of GDP in five years, while FDI declined by 1 percentage point. The latter contrasts with the steep fall in advanced economies and other EMEs, particularly in 2017–18 (Figure 3, see October 2019 *World Economic Outlook* and UNCTAD and ECLAC 2019). Substantive changes in US corporate taxes, the heightened trade tensions around the globe since 2018 may have contributed to the reduction in FDI. Nonetheless, since FDI is arguably a more forward-looking category of capital flows, it is hard to substantiate this claim with data currently available.

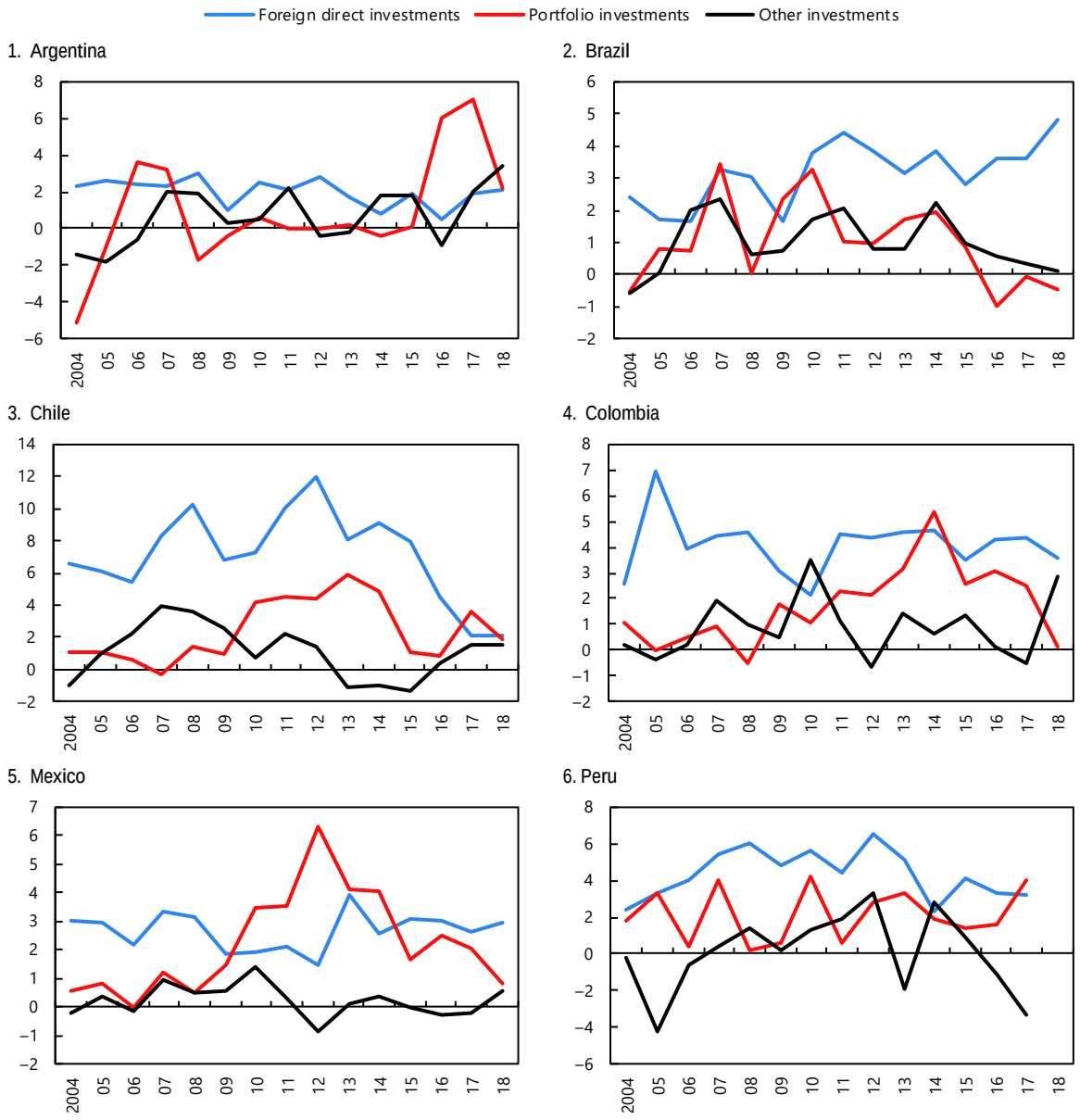
Figure 3. FDI Across Regions and Income Groups
(Percent of GDP)



Sources: IMF, Balance of Payments Statistics database; and IMF staff calculations.
Note: FDI = foreign direct investments.

Aggregate trends mask wide differences across countries. Since 2014, FDI fell sharply in metal exporters (Chile and Peru), but it increased in Brazil (Figure 4). Gross portfolio inflows declined in most countries, except for Peru and Argentina. However, the rise in Argentina in 2016–17 was largely reversed in 2018.

Figure 4. Gross FDI, Portfolio, and Other Investments Inflows
(Percent of GDP)



Sources: IMF, Financial Flows Analytics database; and IMF staff calculations.
Note: FDI = foreign direct investments.

Portfolio and other investment inflows to LAC have been more volatile than FDI inflows. Moreover, this volatility seems to have risen in recent years, which could be partly due to the more challenging external environment, including spikes on global financial market volatility in 2015 and 2018, higher global interest rates as central banks in some advanced economies started normalizing their monetary policies, and lower commodity prices as some large economies slowed down. It could also stem from a higher sensitivity of capital flows to external conditions.

Have the Drivers of Capital Flows Changed for LAC Countries?

Understanding the sensitivity of capital flows to external and domestic factors is important, especially in the current context of prominent downside risks to global and regional growth, volatile global financial conditions, and increased policy uncertainty. The analysis presented in this section follows a dynamic panel approach for a group of EMEs, controlling for push and pull factors and unobservable country-specific characteristics (see Koepke, 2019 for a survey of the literature).[3] The specification considers two push factors—the CBOE volatility index, typically referred to as the VIX, and US long-term interest rates—plus one pull factor, the growth differential with the advanced economies.[4] Separate regressions for total, portfolio, and FDI inflows are presented given the different dynamics across different categories of capital flows discussed above.

The results confirm that the determinants differ across types of capital flows (Tables 1, 2, and 3) in line with the literature. Spikes on global risk aversion (VIX) and higher 10-year US government bond yields tend to reduce gross portfolio inflows to LAC, but they have no bearing on gross FDI inflows.[5] On the other hand, growth differentials vis-à-vis advanced economies have large and statistically significant effects on both types of inflows.

The sensitivity of portfolio inflows to external factors has risen over time. Table 2 shows that, for the LA7 countries, the coefficients on the VIX and 10-year US government bond yield almost double when the sample is restricted to the more recent period 2012–18. In this period, a 10-point rise in the VIX reduces portfolio inflows to the LA7 economies by 1.7 percentage points of GDP, while a 100 basis points increase in the 10-year US bond yield lowers portfolio inflows by 0.8 percentage points of GDP.

Tables 2 and 3 also show that portfolio and FDI inflows have become much more sensitive to growth differentials. For portfolio flows, the coefficient triples when the sample is restricted to 2012–18, while the increase is smaller for FDI. A 1 percentage points rise in the growth differential increases portfolio flows to the LA7 countries by 0.7 percentage points of GDP, and FDI flows by 0.4 percentage points.

The results of the push-pull analysis imply that, given the region's modest growth prospects and the presence of significant downside risks, LAC could experience episodes of sudden stops. Growth in LAC remains weak and the external environment, characterized by heightened US-China trade tensions, increased global uncertainty, slower global growth, and lower commodity prices, continues to be challenging (October 2019 *Regional Economic Outlook: Western Hemisphere*). Against this backdrop, global financial conditions could tighten suddenly, and domestic growth could slow down, which increases the prospects of a sharp decline in capital flows to the region, also known as "sudden stops." The next section delves deeper on potential vulnerabilities to sudden stops in capital flows, as well as the policy options countries have in case such risks materialize.

[3]See Annex 2 for details on the data and methodology. The analysis focuses on gross rather than net inflows as the driving forces of foreign and domestic investors' decisions are different and hence should be analyzed separately (Araujo et al. 2017b). Moreover, shifts in gross inflows might create significant financial vulnerabilities in the recipient country even if net flows remain stable.

[4]The two pull factors are exogenous for LAC, but the growth differential is not. However, endogeneity issues may not be too pervasive if capital flows take time to affect domestic growth. Two other variables, domestic interest rates and sovereign spreads, were excluded because capital inflows could affect them contemporaneously, which would bias the estimates.

[5]The impact of changes in US interest rates on portfolio flows in LAC is different from that in other EMEs. A possible reason is that higher US interest rates have two opposing effects. First, they signal higher returns in U.S assets and thus lead to a reallocation of investment away from EMEs. Second, they signal a stronger US economy, which would benefit EMEs with strong ties to the United States, increasing their capital inflows. The first effect seems to dominate in LAC.

Table 1. Determinants of Total Inflows

	2000–18		
	LAC	LA7	All EMs
Lagged flow	0.23***	0.26***	0.14***
Growth differential	0.61***	0.86***	2.05***
US_10y	(-0.36)**	not significant	1.20***
VIX	(-0.07)***	(-0.10)***	(-0.28)***
Observations	1030	514	2560
	2012–18		
	LAC	LA7	All EMs
Lagged flow	0.17***	0.22***	not significant
Growth differential	1.31***	1.41***	1.36***
US_10y	not significant	not significant	not significant
VIX	not significant	not significant	(-0.42)***
Observations	433	188	1050

Source: IMF staff calculations.

Table 2. Determinants of Portfolio Inflows

	2000–18		
	LAC	LA7	All EMs
Lagged flow	not significant	0.19***	(-0.10**)
Growth differential	0.11*	0.25**	0.23**
US_10y	(-0.35**)	(-0.29**)	0.16*
VIX	(-0.07)***	(-0.08)***	(-0.12)***
Observations	1030	514	2560
	2012–18		
	LAC	LA7	All EMs
Lagged flow	(-0.13)**	0.14***	not significant
Growth differential	0.38***	0.74***	0.29***
US_10y	not significant	(-0.81)*	not significant
VIX	(-0.12)***	(-0.17)***	(-0.10)***
Observations	433	188	1050

Source: IMF staff calculations.

Table 3. Determinants of Foreign Direct Investments

	2000–18		
	LAC	LA7	All EMs
Lagged flow	0.28***	0.22***	0.07***
Growth differential	0.17***	0.38***	not significant
US_10y	not significant	not significant	0.68**
VIX	not significant	not significant	not significant
Observations	1030	514	2560
	2012–18		
	LAC	LA7	All EMs
Lagged flow	0.20***	0.31***	not significant
Growth differential	0.43***	0.52**	not significant
US_10y	not significant	not significant	not significant
VIX	not significant	not significant	not significant
Observations	433	188	1050

Source: IMF staff calculations.

Sudden Stops and How to Deal with Them

"Sudden stops" are extreme dry-ups in foreign finance that lead to a sharp tightening of credit constraints with potentially substantial economic costs (Calvo, 1988; Calvo, Izquierdo, and Talvi, 2006, Cavallo and Powell, 2019). Moreover, sudden stops frequently follow periods of strong capital inflows and growth (Ghosh, Ostry and Qureshi, 2016), thus they are an integral part of the boom-bust pattern of capital flows that afflicts many EMEs.

The empirical literature focuses mostly on the role of external factors in triggering sudden stop episodes, but there are a few studies that address the management of sudden stops (Eichengreen and Gupta, 2017). While policymakers in the region cannot influence the path of global risk sentiment, their actions can affect the likelihood and consequences of sudden stops. This section focuses on policies to deal with sudden stops once they occur, and their effectiveness to reduce their duration and associated output costs. It finds that both the severity and duration of sudden stops can be attenuated by the choice of the policy mix.

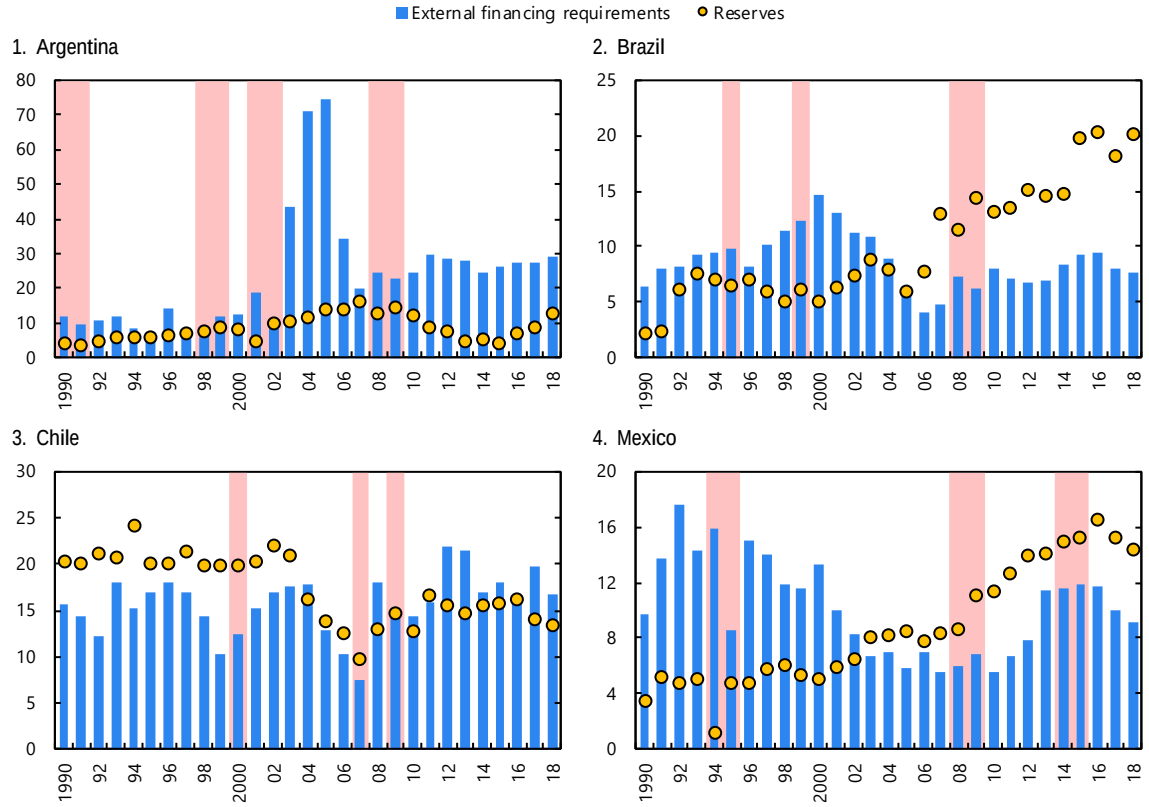
Determinants of Sudden Stops in LAC

External factors are important determinants of capital flows and therefore of sudden stops. Forbes and Warnock (2012) show that sudden stops in gross inflows are driven mainly by swings in global risk aversion. An additional factor that typically affects the likelihood of a sudden stop episode is the initial composition of capital flows. Countries with a larger share of FDI inflows are less likely to experience post-surge reversals that end in economic crises (Ghosh, Ostry, and Qureshi, 2016).

Domestic vulnerabilities can interact with global factors and increase the likelihood of a sudden stop. Moreover, domestic factors can mitigate or amplify the economic costs associated with sudden stops. Large fiscal and current account deficits, and high levels of liability dollarization increase the vulnerability of countries to sudden stops, while high international reserve buffers reduce these vulnerabilities (Cavallo and Powell, 2019, Chapter 2). Furthermore, Cavallo et al., 2017 shows that sudden stops in gross inflows are more likely to be prevented by a repatriation of flows by domestic residents when there is low liability dollarization, low inflation, flexible exchange rates, and high-quality institutions.

Most countries in LAC have moderate vulnerabilities to sudden stops. A useful indicator of vulnerability has been the level of external financing requirements (sum of the current account deficit and short-term external debt) relative to the stock of international reserves. Figure 5 shows that external financing requirements have typically been high relative to reserves in the periods preceding sudden stops and external crises. More recently, external funding pressures have been high in some countries in LAC (including Argentina and Ecuador), but most countries seem to have adequate reserve buffers relative to the projected external financing requirements and some have strong institutions and policy frameworks that allow them to support higher values of the indicator (Figure 6, panel 1). Liability dollarization, a robust predictor of vulnerabilities to sudden stops, has remained broadly stable over the past year in most countries (Figure 6, panel 2), and has declined significantly in Costa Rica.

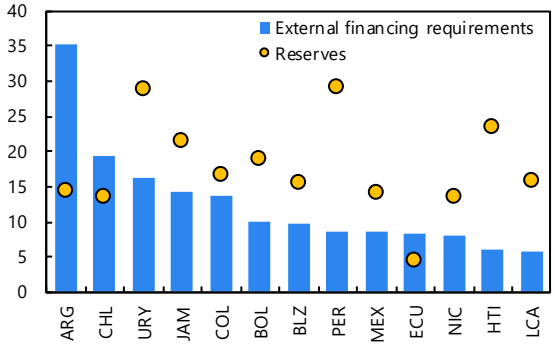
Figure 5. External Financing and Gross Reserves
(Percent of GDP)



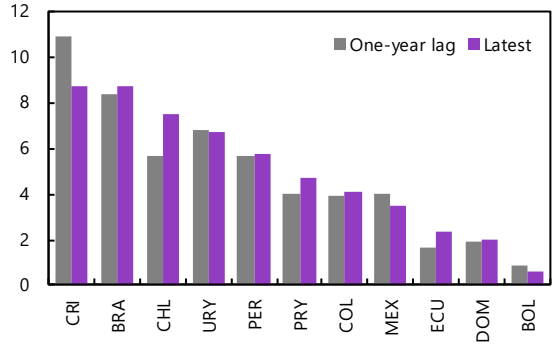
Sources: IMF, International Finance Statistics database; IMF, World Economic Outlook database; and IMF staff calculations.
Note: External financing requirements (public and private sector) is the sum of short-term debt on a remaining maturity basis and the current account deficit. Shaded area refers to sudden stops episodes (see the next section for the definition).

Figure 6. Vulnerabilities to Sudden Stops

1. Projected External Financing Requirements[1] and Gross Reserves, 2019 (Percent of GDP)



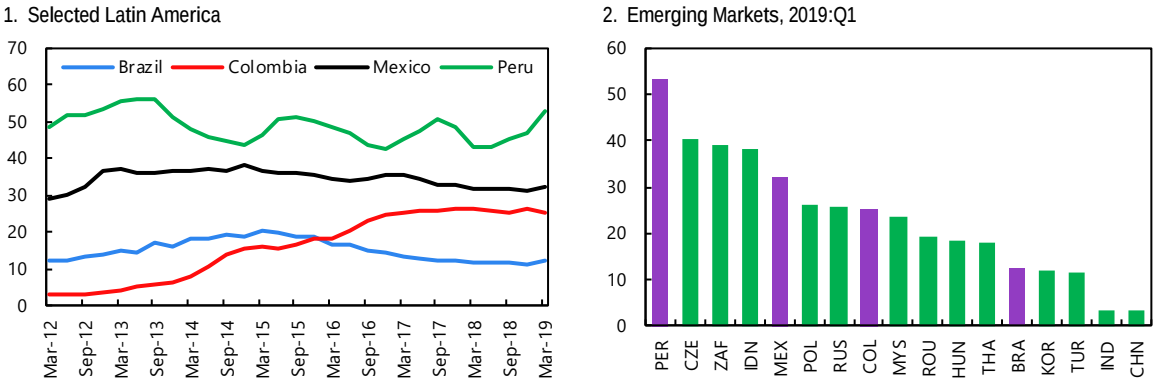
2. Liability Dollarization[2] (Percent of GDP)



Sources: IMF, International Financial Statistics database, IMF, World Economic Outlook database; and IMF staff calculations.
Note: Data labels use International Organization for Standardization (ISO) country codes.
[1]External financing requirements (public and private sector) is the sum of short-term debt on a remaining maturity basis and the current account deficit.
[2]Liability dollarization defined as bank foreign borrowing as a share of GDP in line with Cavallo et al. (2017). Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, Mexico, and Paraguay are 2019:Q2; Peru is 2019:Q1; and Uruguay is 2018:Q4.

An additional potential vulnerability to sudden shifts in market sentiment is foreign investors' participation in local debt markets. As Figure 7 suggests, since 2012 foreign participation has increased significantly in Colombia (from low levels), marginally in Mexico and Peru (from high levels) and remained stable at low levels in Brazil. In a comparison with other EMs outside the region, Peru stands out as having a relatively high foreign participation rate.

Figure 7. Foreign Ownership in Local Currency Government Debt Markets
(Percent of total)



Sources: Haver Analytics; and The Institute of International Finance.
Note: Data labels use International Organization for Standardization (ISO) country codes.

From a longer historical prospective, the LAC region has currently weaker fundamentals than prior to the sudden stop episode of 2008–09. Liability dollarization, fiscal deficits, and public debt are all higher today than at the end of 2007 in most countries (Figure 8, panels 1, 2, and 3). The only exception is the improvement in the external position, with most countries having larger reserve buffers relative to their gross external financing needs today than in 2007 (Figure 8, panel 4).

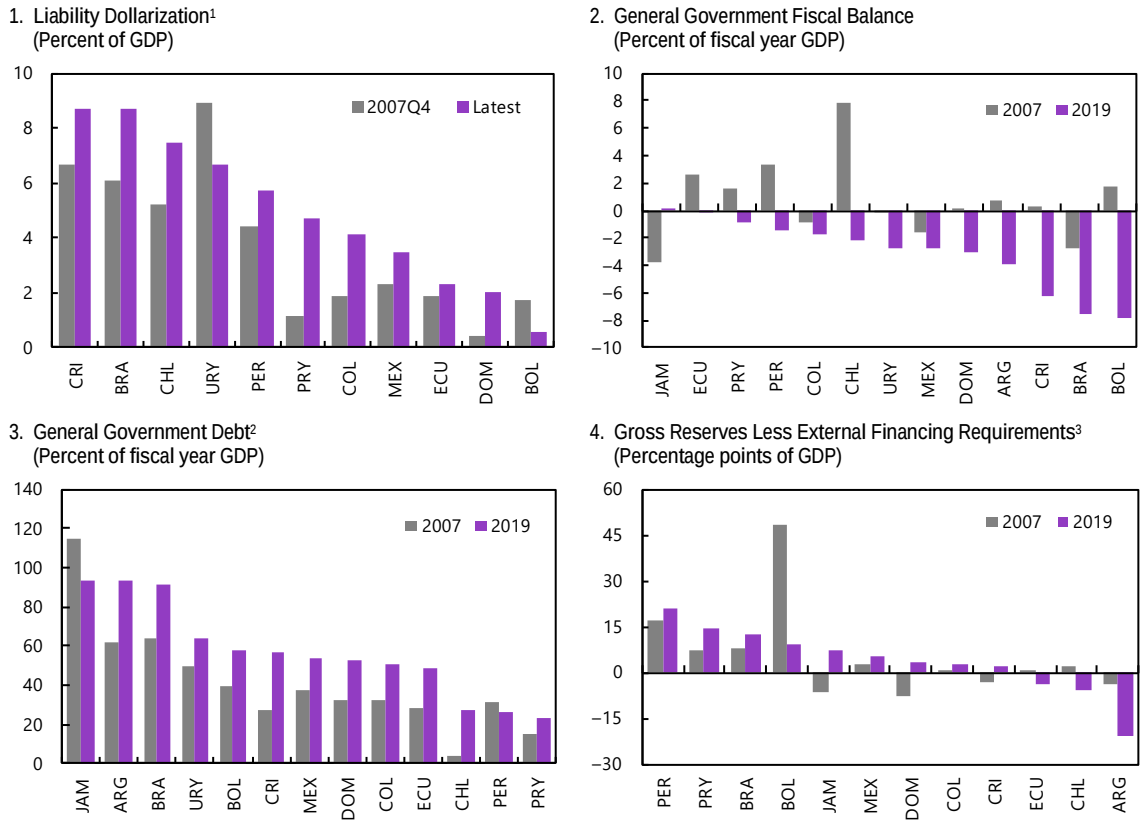
The existence of domestic vulnerabilities and increased uncertainty in the global economy has raised the likelihood of sudden stops in the future. The remainder of the chapter studies how countries in the region have reacted to mitigate the adverse effects of sudden stops, in particular how different policies can reduce the duration and costs of sudden stops.

Identifying Episodes

Before analyzing the policy responses, this section discusses the strategy used to identify sudden stops in private capital flows (excluding reserves and other official flows).[6] Following the algorithm proposed by Forbes and Warnock (2012), sudden stops are defined as an event in which the year-over-year change in four-quarter moving average of capital inflows is more than two standard deviations below the historical average for at least a quarter.[7] A total of 278 sudden stops episodes are identified using data from 1970 for 165 countries, of which 43 are from LAC.[8] The average duration of an episode is 3.89 quarters.

[6]The analysis uses data on gross private capital inflows (excluding reserves and other official flows) at a quarterly frequency from the IMF's Research Department Financial Flows Analytics (FFA) database (Bluedorn et al., 2013).
[7]The historical average is calculated over the past five years (rolling means). The episode lasts for all consecutive quarters for which the change in capital flows is more than one standard deviation below the historical average.
[8]The full list of episodes is presented in David and Goncalves (2019).

Figure 8. Changes in Macroeconomic Vulnerabilities, 2007 versus 2019



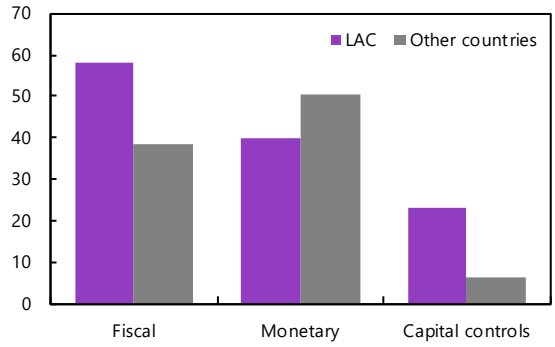
Sources: IMF, International Financial Statistics (IFS) database, IMF, World Economic Outlook (WEO) database; and IMF staff calculations.
Note: Data labels use International Organization for Standardization (ISO) country codes.
[1]Liability dollarization defined as bank foreign borrowing as a share of GDP in line with Cavallo et al. (2017). Latest data for Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, Mexico, and Paraguay are 2019:Q2; Peru is 2019:Q1; and Uruguay is 2018:Q4.
[2]Gray bar for Uruguay reflects data for 2008.
[3]External financing requirements (public and private sector) is the sum of short-term debt on a remaining maturity basis and the current account deficit. Reserves data for 2007 are from the IFS; 2019 data are from WEO.

Not all identified sudden stops episodes are accompanied by declines in GDP growth. Arguably, the analysis of sudden stops that lower economic activity is of greater policy interest. Thus, the analysis also looks at the number of quarters of subpar growth after a sudden stop (if such growth deceleration occurs). For any given country and sudden stop episode, the eight-quarter moving average GDP growth rate in the quarter preceding the start of a sudden stop episode is compared with the growth rate at the onset of the episode and subsequent quarters. The end of the episode is defined as the quarter in which growth equals or exceeds the one prevailing before the sudden stop for at least two quarters (see David and Goncalves, 2019 for details). A total of 130 episodes of growth decelerations linked to sudden stops are identified, of which 21 cases are in LAC. The average duration of an episode is 10.6 quarters.

How Have Countries Responded to Sudden Stops?

There are noticeable differences in the policy response to sudden stops across EMEs (Figure 9). LAC countries have tended to tighten fiscal policy more often (58 percent of the time) than other EMEs (38 percent of the time). In contrast, LAC countries have tended to tighten monetary policy less often (40 percent of the time) than other EMEs (50 percent of the time). Interestingly, countries in the region have also tended to rely more on capital account restrictions to deal with sudden stops.

Figure 9. Policy Tightening in Sudden Stops
(Percent of cases)



Source: IMF staff calculations.
Note: LAC = Latin America and the Caribbean.

While the discussion above documents the responses taken by governments in practice, it does not address the complex issue of whether these policies were optimal. The theoretical literature on the optimal policy response to sudden stops has focused mostly on the role of monetary policy and capital controls in models with occasionally binding constraints on external borrowing. Devereux and Yu (2019) show in a small open economy model with financial frictions and nominal rigidities that the optimal use of monetary policy instruments and capital controls in a sudden stop depends on the exchange rate regime. The optimal policy mix need to balance a trade-off among three different goals: correcting externalities linked to the collateral constraint, reducing output gaps, and stabilizing prices and wages. In a floating exchange rate regime, the optimal responses with discretion involves expansionary monetary policy and tightening of capital controls. With commitment, the optimal response would entail an initial monetary expansion followed by tightening and an increase in capital controls followed by a relaxation. In a pegged exchange rate regime, monetary policy has no independent role and a "capital inflows subsidy" boosting borrowing would be the optimal response. In addition, Braggion, Christiano, and Roldos (2007) show that interest rate increases can be an optimal response to sudden stops as policy tightening contains the real exchange rate depreciation that tightens the external collateral constraint, thereby mitigating net outflows.

Leyva (2019) analyzes the role of fiscal policy during sudden stops and shows that the optimal response depends on the shares of traded and non-traded goods on public and private expenditure. When the share of non-traded goods in public expenditure is higher, a fiscal expansion during a sudden stop leads to an exchange rate appreciation that alleviates the binding collateral constraint and mitigates the negative shocks to output. But from a practical standpoint, a fiscal expansion might engender concerns in terms of sustainability, thereby leading to increases in sovereign spreads with likely adverse effects.

Therefore, there is some ambiguity in terms of optimal policy responses to sudden stops in the literature. The appropriate use of monetary and fiscal instruments as well as capital account management policies will likely depend on country characteristics and policy frameworks, including the exchange rate regime.

What Affects the Duration of Sudden Stops and Growth Decelerations?

In absence of a clear policy prescription to manage sudden stops, this section analyzes which policy responses can help shorten the duration of the sudden stop and the ensuing contraction in output using empirical methods of duration analysis (see Annex 3). Four policies are considered: (i) monetary policy; (ii) sales of international reserves[9]; (iii) changes in capital account restrictions; and iv) fiscal policy (see Annex 4 for variables definitions and sources).[10]

Table 4 presents the results for sudden stops and growth decelerations following a sudden stop. It shows the estimates of the marginal effect of each of these variables on the probability of the event (the sudden stop or the growth deceleration) ending in the next quarter. The estimation considers parametric duration models.

The results show that the likelihood of "exiting" a sudden stop episode increases with the flexibility of the exchange rate regime and the level of the terms of trade. More flexible exchange rate regimes increase the probability of exit by at least 60 percent and a rise in the terms of trade of 2.5 percent (1 standard deviation) increases it by about 25 percent.

Monetary policy tightening also increases the probability of exiting a sudden stop. A rise of 3 percentage points in ex-post real interest rates increase that probability by 15 percent. As sudden stops typically lead to higher inflation through currency depreciation, a rise in ex-post real interest rates in this case typically entails a large increase in nominal interest rates that more than offset the increase in inflation.

Capital controls, tighter fiscal policy, or sales of international reserves do not have statistically significant effects on the duration of sudden stops. The stance of fiscal policy is measured as the change in the structural primary balance, which controls for the economic cycle and commodity prices. Its statistical insignificance is in line with the theoretical results of Leyva (2019) and it may reflect two opposing forces at play. While a looser fiscal policy can boost economic activity through demand channels, it might also increase risk premia via a worsening of debt dynamics. The former would attract capital inflows, while the latter would discourage them. The results suggest a muted net effect of these opposing forces.

The analysis so far has focused on one aspect of the economic costs of sudden stops: the duration of the ensuing negative growth spell or lack of market access. An additional aspect of interest is the depth of the contraction following a sudden stop.

[9]For a broader discussion on the use of FXI beyond episodes of sudden stops, see Werner et al. (2019).
[10]Debt restructuring could also be added to the list, but it has not been prevalent enough to allow for meaningful econometric analysis. Policy variables are usually included as the change over four quarters following the onset of a sudden stop episode.

Table 4. Duration Models of Sudden Stops and Growth Decelerations

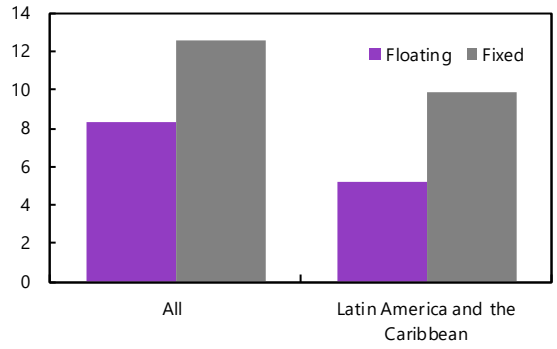
	Sudden Stops		Growth Decelerations	
	(1) Weibull	(2) Gompertz	(3) Weibull	(4) Gompertz
GDP per capita (initial)	0.76**	0.76**	0.74**	0.75**
	(-2.43)	(-2.18)	(-2.30)	(-2.21)
Exchange rate regime (initial)	1.62***	1.96***	1.84***	1.81***
	(2.86)	(3.76)	(2.80)	(2.86)
Δ Terms of trade	1.13***	1.12***	1.10***	1.09***
	(2.95)	(2.84)	(2.64)	(2.88)
Δ Monetary	1.03	1.06*	1.05***	1.05***
	(1.16)	(1.93)	(3.06)	(3.23)
Δ Fiscal	1.02	1.02	0.99	0.99
	(0.71)	(0.82)	(-0.18)	(-0.31)
Δ Reserves	1.01**	1.01***	1.01	1.01
	(2.12)	(2.65)	(1.50)	(1.59)
Δ Capital controls	0.96	1.00	0.97	1.03
	(-0.17)	(-0.014)	(-0.066)	(0.073)
Constant	0.16	0.41	0.34	0.79
	(-1.57)	(-0.74)	(-0.85)	(-0.19)
θ	2.90***		1.57***	
	(12.69)		(8.07)	
		1.83***		1.06***
γ		(10.39)		(5.70)
Observations	145	145	97	97

Source: IMF staff calculations.
Note: Exponentiated coefficients. t-statistics in parentheses. Standard errors clustered by country. Weibull and Gompertz refer to the distributions assumed for the baseline hazard (see Annex 3).
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

The Output Costs of Sudden Stops

The loss of output in the LAC countries after a sudden stop is substantial, averaging 7.4 percent of the pre-sudden stop trend GDP, with a maximum of 29.3 percent (Figure 10). The loss of output is calculated as the difference between a counterfactual level of real GDP (Y*) and actual GDP (Y), as percent of Y*the counterfactual GDP level: (Y*-Y)/Y*. The counterfactual is defined as the level of real GDP that would have prevailed had the country continued to grow at the pre-sudden stop trend growth rate. In turn, the pre-sudden stop trend GDP growth rate is given by the average growth rate in the eight quarters before the sudden stop. Finally. the differences between the two levels of outputs over the quarters after the onset of a sudden stop for which growth remains below the pre-sudden stop trend is calculated.

Figure 10. Average Costs of Sudden Stops
(Percent of trend GDP)



Source: IMF staff calculations.

Previous studies have found that the costs of sudden stops in capital flows vary according to the nature of the episode. For example, reversals of gross inflows are less costly when domestic agents repatriate part of their capital, thus mitigating the impact on net flows (Cavallo et al., 2015 and Cavallo et al., 2017). Initial conditions also matter, especially the state of domestic fundamentals (Cavallo and Powell, 2019).

This section studies how policy responses following a sudden stop might affect the ensuing costs. The analysis uses regressions across a cross-section of sudden stop episodes, including similar explanatory variables as the ones used for the duration analysis. The specification takes the following form, where *i* denotes the episode; the X_m different policy variables; and ToT the terms of trade:

$$Cost_i = \alpha + \sum_{m=1}^{5} \beta_m X_{mi} + \theta(\Delta ToT)_i + \varepsilon_i$$

The results in most specifications suggest that more flexible exchange rate regimes and increases in the terms of trade reduce the costs of sudden stops (Table 5). These results are in line with a large literature on the benefits of exchange rate flexibility, to the extent that it facilitates adjustment to external shocks. Other policy variables do not affect the cost of sudden stops significantly. These findings contrast with those of Hutchison et al. (2010), which finds that monetary and fiscal tightening after sudden stops are significantly correlated with larger output losses, while fiscal expansions are linked to smaller output losses following a sudden stop, but monetary expansions have no effect. Our analysis questions the robustness of these results.

Table 5. Correlates of the Output Costs of Sudden Stops

	(1) Costs	(2) Costs	(3) Costs	(4) Costs	(5) Costs
Exchange rate regime (initial)	-3.270*	-3.514*	-3.633*	-3.671*	-3.112
	(1.889)	(1.950)	(1.949)	(2.020)	(2.134)
Δ Terms of trade	-1.780***	-1.810***	-1.809***	-1.798***	-1.681***
	(0.279)	(0.334)	(0.333)	(0.341)	(0.338)
Δ Monetary policy		-0.196	-0.219	-0.206	-0.357**
		(0.140)	(0.141)	(0.143)	(0.165)
Δ Reserves			-0.0484	-0.0494	-0.0380
			(0.0402)	(0.0448)	(0.0461)
Δ Capital Controls				-2.241	-1.275
				(3.362)	(3.512)
Δ Fiscal policy					0.394
					(0.370)
Constant	9.272***	9.217***	9.784***	9.981***	10.02***
	(1.376)	(1.455)	(1.527)	(1.574)	(1.656)
Observations	126	115	115	112	97
R^2	0.273	0.242	0.252	0.255	0.288

Source: IMF staff calculations.
Note: Standard errors in parentheses.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Conclusions and Policy Implications

Since 2015, capital inflows to LAC have moderated and have become more volatile, with portfolio flows driving the rise in volatility. Moreover, capital flows have become more sensitive to global risk aversion, US interest rates, and growth differentials vis-à-vis advanced economies. These trends have increased the likelihood of experiencing sudden stops in capital inflows in the region if growth continues to falter or if global financial conditions suddenly tighten.

While external factors are key determinants of the occurrence of sudden stops, domestic vulnerabilities can amplify the costs associated with them. Large fiscal and current account deficits and high levels of liability dollarization increase the country's vulnerability to the adverse effects of sudden stops, whereas low inflation and adequate reserve buffers reduce it. Current domestic vulnerabilities in the region seem

contained, with most countries having moderate levels of liability dollarization and adequate reserve buffers relative to their projected external financing requirements.

The policy response in the wake of a sudden stop can affect its duration and mitigate its associated costs. Floating exchange rate regimes reduce the duration of sudden stops and the output losses associated with them. The effects are quantitatively large: a flexible exchange rate regime increases the probability of exiting a sudden stop by at least 60 percentage points relative to a fixed exchange rate regime. Monetary policy tightening also shorten the duration of sudden stops, with a rise in real interest rates of 3 percentage points reducing the duration of a sudden stop by close to 15 percent. Fiscal policy, sales of international reserves, and capital controls do not have any statistically significant effects on the duration of sudden stops.

The analysis presented here reinforces the role of exchange rate flexibility in mitigating the impact of external shocks and does not corroborate the idea that tightening monetary policy during crises is in general a bad idea (in that context see also Boorman et al., 2000). It also cautions against overstating the power of capital account restrictions in insulating countries against the consequences of external shocks.

The results of the chapter also have direct implications in terms of policies responses to external adverse shocks, which could include the coordination of monetary policy instruments, exchange rate flexibility and foreign exchange market interventions (FXI),[11] macroprudential measures; as well as capital flow management measures.

[11]As discussed in the chapters of Werner et al. (2019), many central banks in the region frequently respond to external shocks with FXI for a variety of reasons, including financial stability concerns in highly dollarized countries arising from balance sheet mismatches. Clear communication can help preserve the credibility of inflation targeting (IT) frameworks and avoid the appearance of conflicting objectives among FXI and IT.

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Annex 1. Surges in Capital Inflows and Domestic Investment

This annex looks at the association between capital inflows surges and investment booms. The evidence suggests that large inflows and capital formation are highly positively correlated in LAC but not in other EMEs. This pattern is particularly evident during the commodity super-cycle, and suggests that a dry-up of external financing triggered by exogenous shocks (like a spike in global financial market volatility) may hamper investment even when the domestic economy is performing well.

Surges in gross capital inflows are identified using a modified version of the Hausmann, Pritchett and Rodrik (2005) algorithm. The methodology classifies an episode of high capital flow growth as a surge if it satisfies the following two conditions: (i) the growth rate of inflows in the years following the episode must exceed the growth rate in the preceding years, and (ii) gross capital inflows have to be positive at the start of the episode. More technically, the following variables are computed:

For every 4-year window, the average growth rate of yearly gross capital inflows (GKF) is computed as: $\bar{g}_{it}^{KF} = \frac{1}{4}\sum_{j=t}^{t+4}\left(\frac{GKF_j - GKF_{j-1}}{GKF_{j-1}}\right)$

Then, for every date t, the difference between the average growth rate in the previous four years and the average growth rate in the four years starting in t, is defined as $dif\ g_{it}^{KF} = \bar{g}_{it}^{KF} - \bar{g}_{it-4}^{KF}$

A surge in gross capital inflows is identified when the following conditions are satisfied: (a) $\bar{g}_{it}^{KF} \geq \bar{g}_{75}^{KF}$ (the growth rate is higher than the 75th percentile of the growth distribution); (b) $dif\ g_{it}^{KF} \geq dif\ g_{75}^{KF}$ (the growth acceleration is higher than 75 percentile of the distribution of growth accelerations); (c) $GKF_t \geq 0$ (gross capital inflows are positive at the beginning of the episode).

Having identified the surges in gross capital inflows, the following simple OLS regression is estimated:

$$Investment\ growth_{it} = \alpha + \beta * Post\ Surge_{it} + \varepsilon_{it} \quad (1)$$

The parameter β captures the difference in investment growth between the pre-surge and post-surge periods. The relation should not be interpreted as causal, as both investment and capital flows affect each other and depend on other factors not included in the analysis . This equation is estimated for several time periods, country samples, and windows around the capital flow surge.

Annex Table 1 shows that real investment growth accelerates around episodes of strong capital inflows, but the size and significance of the accelerations vary across samples and time periods. For the average EME, investment growth increases by 1.7 percentage points after a capital flow surge, but the effect is not statistically significant (Panel A, Column (1)). In contrast, the LA7 countries experience a sharp and statistically significant acceleration in investment growth by 11 percentage points in the years following surges of gross capital inflows (Panel A, Column (2)).

The difference in the response of investment in LAC versus other EMEs is even larger in the post-2000 period. Columns (3)-(4) show that surges in capital flows in the 1990s were not associated with higher investment growth in the LAC-7 countries, while columns (5)-(6) show that in the post-2000s they were associated with large increases. This difference may be due to the factors underlying the episodes of strong capital inflows in each period. In the 1990s, strong capital inflows were associated with optimism on the reforms in the region, which faded quickly as many countries experienced severe economic and financial turmoil. In contrast, the inflows of the 2000s were driven by more persistent improvements in macro-financial frameworks and favorable external conditions, including high commodity prices.

The acceleration of investment growth is largest during the first few years following the capital flow surge (Panel B). The estimated difference between pre and post capital flow surge investment growth is larger when analyzing the smaller window (2 years post vs. 2 years prior) than when using the longer window

(4 years post vs. 4 years prior) in all cases, and many of the estimated growth differences that were not significant at the 4-year window, become significant at the 2-year window. However, the stronger increase in investment growth after capital flow surges in the LA7 countries relative to other EMEs remains.

Annex Table 1 also shows that the LA7 countries typically have lower investment rates in the pre-surge years compared to other EMEs, suggesting that investment growth in the LA7 countries is intimately tied to the availability of external financing.

Annex Table 1. Investment Growth Around Episodes of Capital Flows Surges

	Panel A. 4 years prior vs. 4 years post					
	Real Investment Growth					
	1990–2018		1990–2000		2000–18	
	EMEs	LAC	EMEs	LAC	EMEs	LAC
	(1)	(2)	(3)	(4)	(5)	(6)
Post Capital Flows Surge	1.698	11.03**	5.179*	-4.156	0.553	16.09***
	(1.828)	(4.236)	(2.821)	(7.230)	(2.261)	(4.981)
Constant	6.047***	1.515	1.949	8.530	7.421***	-0.823
	(1.365)	(3.157)	(2.140)	(5.389)	(1.678)	(3.712)
Observations	504	72	132	18	372	54
R-squared	0.002	0.088	0.025	0.020	0.000	0.167

	Panel B. 2 years prior vs. 2 years post					
	Real Investment Growth					
	1990–2018		1990–2000		2000–18	
	EMEs	LAC	EMEs	LAC	EMEs	LAC
	(1)	(2)	(3)	(4)	(5)	(6)
Post Capital Flows Surge	2.868	17.36***	7.494**	8.516	1.107	20.31***
	(1.967)	(5.684)	(3.282)	(9.900)	(2.407)	(6.884)
Constant	5.127***	-0.432	1.194	2.169	6.620***	-1.299
	(1.513)	(4.403)	(2.531)	(7.669)	(1.850)	(5.333)
Observations	267	40	74	10	193	30
R-squared	0.008	0.197	0.068	0.085	0.001	0.237

Sources: IMF, Financial Flows Analytics database; IMF, World Economic Outlook database; and IMF staff calculations.
Note: Standard errors in parentheses.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Annex 2. Determinants of Capital Flows: Data and Methodology

To study the drivers of capital flows, econometric specifications are estimated over two sample periods, 2000–18 and 2012–18. The analysis uses the data from the Financial Flows Analytics (FFA) database (Bluedorn et al., 2013) for 165 countries at a quarterly frequency starting in 1990, complemented with data from the IMF's Balance of Payments Statistics, Haver Analytics, CEIC and EMED databases.[1] The FFA database has data on private capital flows within the ``other investment'' category, which exclude flows to the general government and monetary authorities as well as IMF lending and reserve asset accumulation. Thus, the FFA data allows the analysis to focus on flows that respond to market forces.

The empirical literature on the determinants of capital flows typically splits the control variables into "pull" and "push" factors (Calvo et al., 1996, Koepke, 2019). The former refers to domestic forces that attract capital flows to the country (domestic growth, structural reforms, etc.), while the latter refers to exogenous external factors driving capital flows to EMEs (lower rates of return in advanced economies, lower global risk aversion). More specifically, the analysis this chapter includes the following push factors: (i) growth in advanced economies; (ii) US 10-year government bond yields; and (iii) global risk aversion measured by the CBOE VIX index. It also includes domestic growth as a pull factor. Domestic interest rates were not included as pull factors because of endogeneity considerations.

Since investment decisions are not fully reversible in the short term, the lagged dependent variable was added as an explanatory variable, in addition to the pull and push factors mentioned above, which is also useful to attenuate possible omitted variable biases. The inclusion of lagged dependent variable, however, implies biased standard fixed-effects estimators, and thus the chapter reports results from system-GMM regressions instead (Arellano-Bond estimator).

[1]The FFA data on capital flows starts in 1970, but data on other variables included in the analysis start only in the 1990s.

Annex 3. A Brief Overview of Duration Analysis

To investigate what lies behind the duration of a sudden stop one cannot resort to traditional linear methods because the distribution of the variable "time to an event" is almost certainly non-symmetric, hence normality of the residuals is unlikely to be an adequate assumption. Therefore, ordinary least squares estimation of the parameters would not be appropriate.

In duration models, survival time is assumed to follow a distribution with a certain underlying density function, f(t). The so-called survival function, S(t) is given by: $S(t) = P(T > t) = \int_t^{\infty} f(z)dz$.

From this, the hazard function can be derived, $h(t) = -\frac{\frac{dS(t)}{dt}}{S(t)}$, which is the instantaneous probability of failure at *t* given non-failure up to that point in time. In general, the hazard will be a function of a vector x of (possibly country-specific) controls. This allows for analysis of how a change from x_i to x_{i+1} affects the probability of failure.

There are three types of survival analysis models: non-parametric, semi parametric and fully parametric. Non-parametric models assume a universal survival distribution for all units of observation in the sample and does not depend on any controls. Semi parametric models assume the existence of a non-parametric common baseline distribution that shifts multiplicatively according to the controls included in the regression. In fully parametric models, different functional forms for the shape of the baseline distribution are tested and estimated.

The chapter uses parametric models. Proportional hazard (PH) models estimate the hazard function:

$$h(t_j|x_j) = h_0(t)exp(x_j\beta)$$

In which $h(t_j|x_j)$ is the hazard function and $h_0(t)$ is the baseline hazard function (the hazard function when all explanatory variables are assumed to have zero value) and x_j is a vector of covariates.

Alternative formulations of the PH models make varied assumptions about the distribution of the baseline hazard. If the data exhibits duration dependence, i.e. if the hazard rate is expected to increase or decrease with time, the Weibull distribution is frequently used. This distribution assumes that the baseline hazard function is given by $h_0(t) = \theta t^{\theta-1}$, where the parameter θ captures the duration dependence.

Annex 4. Data Sources and Definitions for Sudden Stops Analysis

Capital flows. Total Gross Non-Official Flows (ICAPFLP) in U. S. dollars from the IMF's Financial Flows Analytics (FFA) database. Capital flows in nominal dollar terms were deflated using the US GDP deflator.

Real GDP in national currency units. For most countries we rely on quarterly data from IMF's International Financial Statistics Database (IFS). Nevertheless, we use data from Haver Analytics when information in the IFS was missing or with more limited availability. This is the case for the following countries: AZE; BHR; BLR; BLZ; BRA; CHN; CMR; COL; DEU; DNK; FIN; GHA; GTM; HND; IDN; IND; ITA; JOR; JPN; KAZ; KWT; LKA; LSO; MEX; MNE; MNG; MOZ; NAM; NGA; NIC; PAN; SLV; UGA; URY; VNM; ZAF; ZMB.

Real GDP per capita. Data from the Maddison Project database (Bolt et al., 2018).

International reserves. Official reserve assets in millions of US dollars from the IMF's IFS database.

Monetary policy rates. We rely on policy rates from Thomson Reuters Datastream. Nevertheless, we use information from the IMF's IFS Database for money market rates and for discount rates when data on policy rates is not available. The real (ex-post) interest rate is calculated using CPI inflation data from the IMF's IFS database.

Fiscal balance. General government primary net lending/borrowing as a share of GDP from the IMF's World Economic Outlook (WEO) database. In the regressions, the measure of fiscal policy is constructed using the residuals from a simple OLS regression of a constant and on real GDP growth and growth in the commodity terms of trade series in order to control for the effect of automatic stabilizers on the balance.

Capital account restrictions. Index of de jure capital account openness constructed by Chinn and Ito (2006) based on information from the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER). Higher levels of the index indicate a more open capital account.

Terms of trade. Log of the commodity net export price index constructed by Gruss (2014).

Exchange rate regimes. Coarse de facto exchange rate regime classification from Ilzetzki, Reinhart, and Rogoff (2017). Categories 1 and 2 were classified as fixed-exchange rate regimes and categories 3 and 4 as floating exchange rate regimes.