When Do Capital Inflow Surges End in Tears?[†]

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The global financial crisis (GFC), and subsequent events such as the US sovereign downgrade and the "taper tantrum," have been rude reminders of the volatility of cross-border capital flows to emerging market economies (EMEs), and its consequences. The highly episodic nature of these flows suggests that emerging markets with open capital accounts are necessarily at the mercy of global events that are beyond their control. But are there policy measures that these countries can undertake (or have in place) during the inflow phase to mitigate the impact of a subsequent reversal? That is the question we take up in this paper.

We begin our analysis by identifying *surge* episodes—that is, periods of exceptionally large net capital inflows—in a sample of 53 EMEs over 1980–2014. We then classify these episodes according to whether they end in a "crash" (a financial crisis) or a soft-landing, and associate the outcome with shifts in global conditions, as well as with domestic factors and policy responses over the surge episode.

Our analysis yields 152 completed surge episodes, with highly synchronized endings and highly synchronized crashes—clustered around the East Asian financial crisis (1997), the global financial crisis (2007–2008), and more recently, the US sovereign debt rating downgrade (2011), and the taper tantrum (2013). In the full sample, about 20 percent of surge episodes end in a financial crisis. The synchronicity of surges ending in a crash suggests that global factors matter in determining the post-surge outcome, while the diversity of outcomes points to a possible role for domestic conditions and policy responses.

Indeed, we find that changes in global conditions (US interest rates, global risk aversion, and commodity prices) have an important bearing on how surge episodes end, but countries that allow the buildup of macroeconomic imbalances and financial vulnerabilities—credit expansion, currency overvaluation, and economic overheating—and that receive most of their flows in the form of debt are also significantly more likely to end the episode with a crash. By contrast, those with a higher stock of foreign exchange reserves and a larger share of inflows in the form of foreign direct investment (FDI) are significantly less likely to experience a crisis.

Our analysis makes several contributions to existing studies. While a burgeoning literature examines the determinants of capital flows to EMEs and the potential risks they pose—typically finding a strong positive association between inflows and subsequent crises—they tend to overlook the fact that not all countries receiving large inflows ultimately experience a crisis.[1] Likewise, several studies analyze policy responses in the face of the crisis, whereas we focus on policies that could be adopted in "good times" (when capital is entering the country) to prevent a bad outcome when the global tide turns.[2]

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[1]On recent studies looking at the determinants of large capital flows to EMEs, see Reinhart and Reinhart (2008), and Ghosh et al. (2012). On the crisis risks associated with capital flows, see, e.g., Caballero (forthcoming), and Ghosh, Ostry, and Qureshi (2015).

[2]An exception is Cardarelli, Elekdag, and Kose (2010), who examine the correlation between domestic conditions during inflow surges and eventual growth outcomes, but their sample commingles advanced and emerging market economies. Our analysis has strong parallels to the related

I. Hard versus Soft Landings

To identify surge episodes, we follow Ghosh et al. (2012), who define a surge as a net capital flow observation that lies in the top thirtieth percentile of both the country-specific and the full sample's distribution of net capital flows, expressed in percent of GDP.[3] We focus on *net* (based on liability and asset) flows, as surges and sudden stops in EMEs have largely been a net flow phenomenon. Results, however, are broadly similar if we use liability flows—i.e., those driven by foreign investors (commonly referred to as "gross inflows").

Applying the above definition yields 344 surge observations in our panel of 53 EMEs over 1980–2014. Grouping consecutive surge years, we obtain 165 episodes—of which 152 are completed as of the end of the sample (see the online Appendix for details). An initial snapshot of surge endings shows that they are highly synchronized (Figure 1)—occurring most frequently around 1997 (onset of the East Asian financial crisis), 2007–2008 (the global financial crisis), and recently, in 2011 and 2013 (the US sovereign debt rating downgrade and taper talk, respectively). The occurrence of crash landings is also highly synchronized, with the share of surge episodes ending in a financial crisis increasing sharply in the late 1990s and around the GFC. Nevertheless, even in these years, not all surges end in a crisis and there is considerable cross-sectional variation in the magnitude of the net flow reversal (Figure 2).

Overall, of the 152 completed surge episodes, 30 experienced a financial (banking or currency) crisis within two years of the end of the episode, and 9 experienced a "twin" banking-currency crisis.[4] The implied probabilities (20 percent and 6 percent) are, however, substantially higher
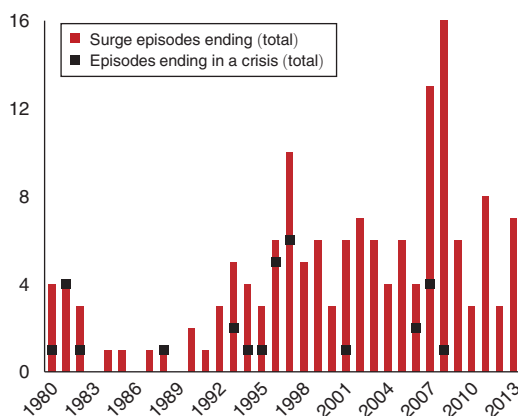

Figure 1. Endings of Surge Episodes in EMEs, 1980–2013

Notes: The figure shows the total number of surge episodes ending, and those that end in a financial crisis in a given year. Data for financial crisis is available up to 2012 only.
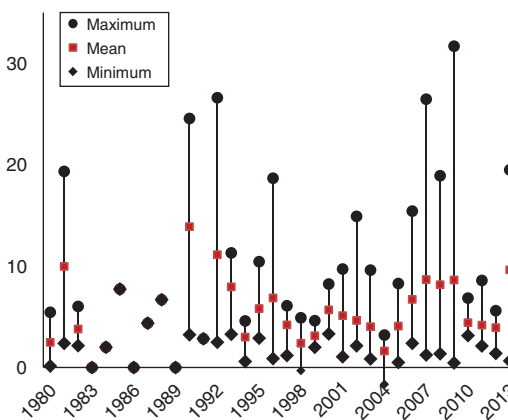
Source: Authors' calculations

Figure 2. Magnitude of Net Flow Reversal
(*In Percent of GDP*)

Note: The figure shows the difference between the average net capital flow (in percent of GDP) over the surge episode, and the two-year average after the episode has ended.

Source: Authors' calculations

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literature on domestic credit booms that end well versus badly (e.g., Barajas, Dell' Ariccia, and Levchenko 2007).

[3] The reason for adopting a country-specific *and* sample-wide criterion is to ensure that surges are large by the country's own experience but also by cross-country standards. This prevents a small uptick as being identified as a surge in countries experiencing mostly capital outflows or small inflows (on a net basis) over the sample.

[4] In the sample, banking crises are more likely to occur after a surge than currency crises. In two cases, a banking crisis is associated with two surge episodes separated by one year. Classifying just one episode (either first or second) as a crash does not affect the results.

than those for the full sample (7 percent and 1 percent), indicating that a country is at least *three times* more likely to experience a financial crisis after surges than in normal times.

Moreover, on average, the magnitude of the net flow reversal is significantly larger in episodes that end in a financial crisis compared to
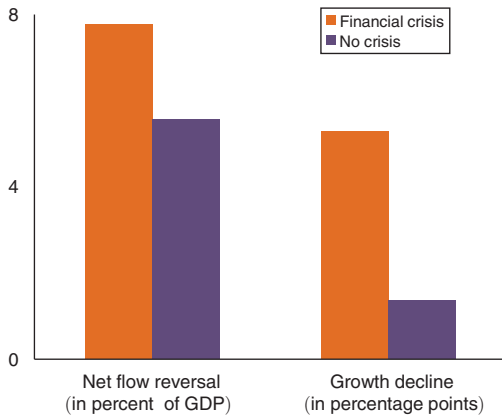
FIGURE 3. POST-SURGE NET FLOW AND GROWTH DECLINE

Note: Net flow reversal and growth decline is the difference between the average over the surge episode and the two-year average after the episode has ended.

Source: Authors' calculations

those that do not (Figure 3)—suggesting that the drop in inflows may trigger the crisis (though it is equally possible that the onset of crisis precipitates the reversal of flows). Growth declines are also significantly larger after surge episodes that end in a crisis.

II. Estimation Methodology

What factors determine whether a surge episode ends gracefully or in crisis? It seems plausible that both global and domestic factors would be relevant. A tricky issue in specifying the empirical model is the timing of the variables (and the period over which the change should be measured). The change in global conditions (US real interest rate, global risk aversion, commodity prices), for example, could be defined either as the change between the *average* value during the surge and the value in the year(s) following the surge, or as the change between the value in the *last* year of the surge and the year(s) following. Since we define crash endings as a financial crisis occurring within two years of the end of the surge, we define changes in global conditions as the average in the two post-episode years relative to the average over the episode. Changes in domestic conditions (current account, fiscal balance, output gap, financial-stability conditions) could be defined

the same way, but using the post-surge value gives rise to a potentially serious endogeneity problem: domestic variables such as the interest rate, output growth, or the current account and fiscal balance generally move in response to a crisis. For this reason, we define changes in domestic variables as average values over the surge episode relative to those in the year before the episode began. This allows us to assess the impact of policies pursued over the surge episode on the outcome (rather than in response to the outcome).

In addition, several domestic factors (such as the degree of currency overvaluation, stock of foreign exchange reserves, external debt, exchange rate regime, etc.) may affect investor sentiment (or otherwise affect the likelihood of a crisis) in level terms. For these variables, we use the value in the last year of the surge episode.[5] The probit model that we estimate thus takes the following form:

$$(1) \quad \Pr(Crisis_{jt|S_{jt-1}=1} = 1)$$
$$= F(\Delta x'_{jt}\delta + \Delta z'_{jt}\eta + z'_{jt}\xi),$$

where $Crisis_{jt|S_{jt-1}=1}$ is an indicator variable of whether country j experiences a banking or currency crisis in period t or $t + 1$, conditional on the inflow surge ending in period $t - 1$; Δx is the change in global conditions (as defined above) *when* the episode ends; Δz is the change in domestic conditions *over* the surge episode; and z includes domestic factors whose level at the *end* of the episode may make the country more vulnerable to crisis. Moreover, we include regional dummies in (1) to capture any contagion from crises in neighboring countries, as well as (pre-episode) country-specific per capita real GDP to control for heterogeneity in institutional development across countries.

III. Empirical Results

We begin by considering the impact of changes in global conditions on the likelihood of a crash-ending, controlling only for region-specific effects, and the country's initial

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[5] For both changes and levels of domestic factors, we exclude values in the top and bottom 0.25th percentile of the distribution. See the online Appendix for variable definitions and data sources.

TABLE 1—POST-SURGE EPISODE FINANCIAL CRISIS PROBABILITY IN EMES

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
US real interest rate[a]	0.224**	0.195*	0.207*	0.192*	0.255**	0.244**	0.169*	0.217**
	(0.102)	(0.104)	(0.107)	(0.103)	(0.108)	(0.104)	(0.101)	(0.105)
Commodity prices[a]	−0.035***	−0.038***	−0.033***	−0.031***	−0.032***	−0.025**	−0.033***	−0.032***
	(0.009)	(0.009)	(0.008)	(0.010)	(0.009)	(0.010)	(0.009)	(0.009)
S&P500 returns' volatility[a]	0.066**	0.039	0.053**	0.067**	0.085***	0.062**	0.066**	0.069**
	(0.028)	(0.030)	(0.027)	(0.030)	(0.031)	(0.030)	(0.030)	(0.029)
Real GDP per capita (log)[b]	0.244	0.159	0.195	0.190	0.521**	0.302	0.145	0.241
	(0.191)	(0.219)	(0.203)	(0.227)	(0.225)	(0.234)	(0.182)	(0.206)
Domestic credit/GDP[c]		0.038***						
		(0.012)						
Output gap[c]			0.046*					
			(0.026)					
Capital account openness[c]				0.534***				
				(0.192)				
FX reserves/GDP[d]					-0.059**			
					(0.023)			
Overvaluation[d]						0.078***		
						(0.022)		
FDI surge[e]							-0.576**	
							(0.251)	
Other investment liability surge[e]								0.461**
								(0.215)
Region-specific effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	142	141	141	131	142	142	142	142
Countries	48	48	48	47	48	48	48	48
R^2 (pseudo)	0.162	0.199	0.159	0.162	0.224	0.254	0.187	0.181
Wald χ^2 (p-value)	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
Percent correctly predicted	84.51	84.40	84.40	87.02	84.51	86.62	83.10	83.80
Sensitivity	19.23	20.00	16.00	19.05	26.92	46.15	23.08	26.92

Notes: Dependent variable is a binary variable equal to one if a banking or currency crisis occurred within two years of a surge episode end. All specifications include a constant and are estimated using the probit model. Clustered standard errors (at the country level) are reported in parentheses.
[a]Difference between the two-year average after the end of the surge episode and the average over the surge episode.
[b]Level in the year before the surge episode started.
[c]Difference between the average over the surge episode and the year before the surge started.
[d]Level in the last year of the surge episode.
[e]FDI dominated surge is defined as where the average net FDI flow (in percent of GDP) received during the surge episode is larger than the average net portfolio or other investment liability flow (in percent of GDP). Similarly, other investment liability dominated surge is where the average net other investment liability flow (in percent of GDP) during the surge episode is larger than the other types of net flows (in percent of GDP).
   ***Significant at the 1 percent level.
    **Significant at the 5 percent level.
     *Significant at the 10 percent level.

per capita real GDP. The results presented in Table 1 (column 1) show that changes in the US real interest rate, commodity prices, and investor risk aversion are strongly associated with a crisis occurring after an inflow surge episode. For instance, against an unconditional probability of 20 percent in the estimated sample, the predicted probability of a crisis (keeping other variables at their mean value) increases by 6 percentage points if US real interest rates rise by 100 basis

points relative to no change in interest rates at all.[6] Similarly, doubling (relative to the average) the increase in global risk aversion when the surge ends, raises the crisis probability by 2 percentage points. Conversely, the probability of a crash ending is about 8 percentage points

[6] In about one-fifth of the surge endings, US interest rates (in real terms) rise by at least 100 basis points.

lower if commodity prices are 10 percent higher (relative to no change) at the end of the surge. Taken together, changes in global conditions explain surge endings rather well: the global factors are jointly highly statistically significant (Wald test p-value $= 0.00$) with a pseudo-R^2 of 16 percent, and 19 percent of crash endings called correctly.

Turning to domestic factors, columns 2–4 in Table 1 indicate that the post-surge financial crisis probability is statistically significantly higher for episodes that experience greater credit expansion, economic overheating (measured by the output gap), and capital account openness. In addition, currency overvaluation strongly raises the probability of a crash landing, whereas a higher stock of foreign exchange reserves reduces it (columns 5 and 6). Surges dominated by FDI flows are also less likely to experience a crisis, while those dominated by other investment liabilities (mostly bank flows) are more likely to end in a crisis (columns 7 and 8). This result suggests that the composition of inflows matters—large inflows in the form of FDI may allow countries to reap the benefits of financial globalization without posing significant risks. Including both global and domestic factors (results not shown), the estimated coefficients remain largely similar in magnitude and statistical significance, while the pseudo-R^2 jumps to 36 percent, and the percentage of crash endings correctly called rises to 40 percent.[7] Broadly speaking, global and domestic factors are thus equally important in determining how surges end.

IV. Conclusion

Emerging markets with open capital accounts are subject to inflow surges that can end gracefully or in some form of crisis. While global factors are a major determinant of how surges end, policy responses of EMEs also matter. Avoiding excessive credit growth, economic overheating, and currency overvaluation; maintaining foreign exchange buffers; and regulating the composition of inflows through (structural or cyclically-varying) capital controls and macroprudential policies (Ostry et al. 2012) lowers the likelihood that the surge will end in crisis. To the extent that certain types of flows are more prone to causing financial crisis in EMEs, their regulation at the source country end could also help (Ghosh, Qureshi, and Sugawara 2014).

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[7] In addition to the variables presented in Table 1, we consider (changes in, and level of) several other variables. Our main conclusions remain robust to alternate specifications; we find some evidence that a deterioration of fiscal balance, increase in bank foreign liabilities, and higher external debt raise the likelihood of a financial crisis.