Sudden Stops and Phoenix Miracles in Emerging Markets

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A decade has passed since the salvos from Mexico's Tequila Crisis of 1994–1995 echoed around the financial world. Since then, many more crises have taken place in emerging market economies (EMs). Furthermore, crises have tended to bunch together, bringing to the forefront the systemic nature of these events. True, every new crisis has its own idiosyncratic features, but useful policy lessons must be derived from robust, empirical *regularities.* This is the research strategy we have pursued in the last few years. We will report on two types of regularities that strike us as highly robust across EM crises: (a) Sudden Stops (of capital inflows) and (b) Phoenix Miracles.

A Sudden Stop is a sharp fall in capital inflows relative to their past trajectory. Sudden Stops are not a common feature in developed economies and display a large degree of temporal *bunching,* suggesting that *global* capital market turmoil acts as a coordinating factor *external* to EMs. As shown in Section I, however, balance-sheet effects—namely, the interaction of large changes in the real exchange rate during Sudden Stops and Liability Dollarization (i.e., foreign-exchange-denominated debts)—are key in influencing the likelihood of a Sudden Stop. Thus, even though the initial shock is, in principle, exogenous to the economy, whether or not it materializes into a Sudden Stop depends on domestic financial vulnerabilities.

On the other hand, a Phoenix Miracle is defined as a case in which output recovers relatively quickly from a sharp collapse with virtually no recovery in credit or capital inflows, and a very weak recovery in investment—hence the reference to the mythical bird "rising from the ashes." The existence of phoenix-like recoveries suggests that financial frictions play a key role in pushing economies to the abyss from which, in some way or another, they can crawl back to safe ground by means less than apparent to the conventional observer looking for standard "fundamentals" and, thus, may appear miraculous. Interestingly, the Great Depression of the 1930s shares some of the key features of Phoenix Miracles in EMs, but shows salient differences as well that suggest nominal labor market rigidities are not crucial in explaining output collapse in EMs. Understanding these regularities could, and we believe does, shed light on policies aimed at preventing crises and attenuating their effects.

I. Sudden Stops

A. *A Basic Conceptual Framework*

In a Sudden Stop episode, the economy faces a sharp increase in international interest rates or outright exclusion from capital markets. Thus, the economy may be pushed to eliminate its current account deficit (*CAD*) or even generate a current account surplus. A current account surplus implies that the country would be paying back outstanding debt, whereas *CAD* is an indicator of the adjustment that the country may not be able to circumvent, *even if it defaults on its outstanding debt.* This is so, because $CAD > 0$ implies that the country is acquiring *new* debt, something that can occur only with the approval of creditors. This *is not a decision that can be taken unilaterally like debt default.* Thus, bringing *CAD* to zero is, in a way, the minimum

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adjustment that an economy must make if subject to a Sudden Stop. *CAD* will be the focus of our analysis.

Considering an economy with a representative individual exhibiting a time-separable utility index and homothetic preferences with respect to tradable and nontradable goods, it can be shown that percentage changes in the equilibrium real exchange rate (i.e., the price of tradable goods vis-à-vis nontradable goods, z) brought about by going from $CAD > 0$ to $CAD = 0$, can be approximated by

$$\frac{\Delta z}{z} = \frac{A}{\beta}\frac{CAD}{c^d} \tag{1}$$

where A is a constant, c^d denotes the demand for tradables, and β is the (constant) price elasticity with respect to z.[1] Notice that the proportional change of the real exchange rate in equation (1) is likely to be a lower bound to the actual change under Sudden Stop, because the current account adjustment can be, and in practice has been, larger than that required for turning *CAD* equal to zero. Moreover, and of greater importance for the econometric analysis, the relevant variable to assess the minimum impact of a Sudden Stop on the real exchange rate is *not* *CAD* as a share of GDP, but *CAD* as a share of the Absorption of Tradables, termed the "leveraged absorption of tradables" in Calvo et al. (2003). These two concepts could yield quite different statistics, as exemplified in Calvo and Talvi (2005) for the cases of Argentina and Chile.

What is the relevance of equation (1)? The real exchange rate is a key relative price. Under normal circumstances, real currency depreciation would be part of the solution for an economy that requires substantial external adjustment. In economies with extensive foreign currency debt—i.e., *Liability Dollarization*—and which are far from the complete-markets Nirvana, however, large real devaluation (i.e., large increase in z) is likely to be associated with financial turmoil, especially in the nontradables sector.[2] To capture this effect in a simple manner, we will focus on Domestic Liability Dollarization (henceforth, DLD), i.e., foreign-exchange-denominated domestic bank loans (as a share of GDP). Notice that this concept, as opposed to the ratio of foreign-exchange deposits to total deposits defined in other empirical studies, is more in line with the phenomenon it intends to capture, i.e., the size of the balance-sheet damage caused by a Sudden Stop.[3]

B. *Empirics*

Our analysis will center on the effects of systemic shocks stemming from world capital markets. For this reason, we focus on countries that are integrated into world capital markets. One possible measure of integration is the ability to place a sizeable amount of international bonds. For this reason, the sample selected for the analysis comprises countries that are tracked by JPMorgan to construct its Emerging Market Bond Index, or EMBI+, as well as developed countries, totaling 32 economies.[4]

Sudden Stops are large and unexpected interruptions in capital inflows. Empirically, we consider that a Sudden Stop takes place when the fall in net capital inflows exceeds two standard deviations below the prevailing sample mean. Under this definition of Sudden Stop, two empirical regularities emerge. First, large real-currency depreciation comes hand-in-hand with Sudden Stops in EMs, something that is not the case in developed countries.[5] Second, Sudden Stops come in bunches.[6] Bunching was particularly striking around the time of the Russian financial crisis of August 1998. Countries affected by Sudden Stops were quite heterogeneous in terms of their macroeconomic conditions, making it hard to argue that there was a sudden and coordinated reassessment of these countries' fundamentals. Rather, a more straightforward explanation is that the Sudden

[1] See Calvo et al. (2004) for a derivation.

[2] Hausmann et al. (2005) refer to Liability Dollarization as original sin.

[3] See, for example, Carlos O. Arteta (2002).

[4] See Calvo et al. (2004) for details on the sample and definitions in this section.

[5] About two-thirds of large, real currency depreciations (i.e., a rise in the real exchange rate exceeding 20 percent) in EMs are associated with Sudden Stops. This is the case for only 17 percent of depreciations in developed countries.

[6] See Figure 3 in Calvo et al. (2004).

Stop was the result of a disruption in international financial markets.

This observation led us to an alternative definition of Sudden Stop, highlighting the relevance of *systemic factors* in EMs, by considering periods of plummeting capital flows that occur in periods of substantial turmoil in global capital markets. Thus, a second empirical measure, which we call Systemic Sudden Stop (henceforth, 3S), superimposes on the previous one the requirement that plummeting capital flows coincide with a period in which *aggregate bond spreads* are unusually large—reaching a spike exceeding two standard deviations above the prevailing sample mean.[7]

A key conjecture in Calvo et al. (2004) and Calvo and Talvi (2005) is that Sudden Stops are likely to be the result of an interaction between systemic capital market forces and domestic financial vulnerabilities. Countries may be subject to sudden, adverse changes in external conditions, but the likelihood of experiencing a Sudden Stop may very well depend on domestic vulnerabilities, of which potential balance-sheet effects could be key. Indeed, these domestic vulnerabilities could act as a filter for the triggering external shock in determining the probability of experiencing a Sudden Stop.[8]

Using either empirical definition of a Sudden Stop, estimation of a probit model with random effects for the sample of developed countries and EMs reveals that the likelihood of a Sudden Stop largely depends on potential balance-sheet effects. Both a measure of potential changes in relative prices as suggested by equation (1), together with a measure of DLD, proxying for bank credit in foreign currency as a share of GDP, are highly significant across estimations encompassing a wide variety of robustness tests.[9] Estimations include other more conventional explanatory variables like fiscal balance, public debt/revenue ratio, exchange rate regime, etc., but none of them turn out to be statistically significant.

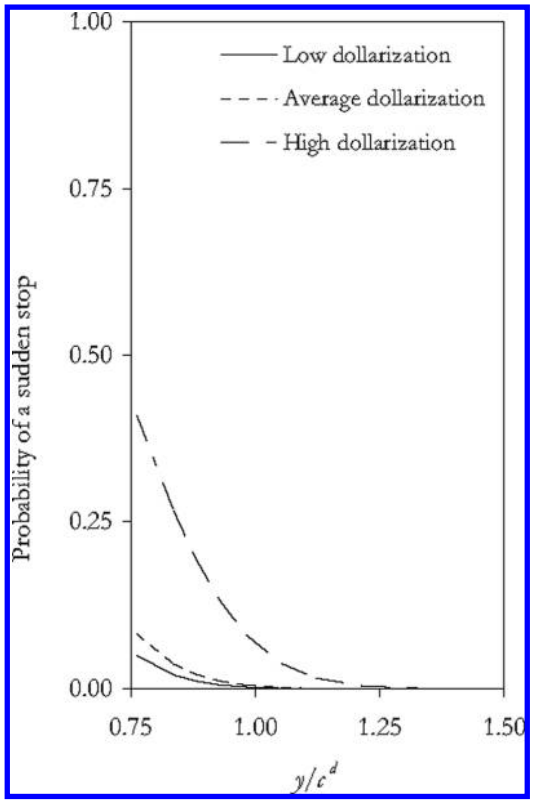

FIGURE 1. PROBABILITY OF A SUDDEN STOP FOR DIFFERENT VALUES OF UNLEVERAGED ABSORPTION (y/c^d) AND DLD

Another key finding is that the interaction between potential changes in the real exchange rate and DLD is critical in determining the probability of a Sudden Stop. This is clearly depicted in Figure 1, which shows the sensitivity of the probability of a Sudden Stop to changes in the unleveraged absorption of tradables—i.e., the share of the absorption of tradable goods financed by the supply of tradable goods (y), or y/c^d, in terms of the framework outlined above—for different levels of DLD.[10]

We find that the effects of the unleveraged absorption of tradables on the probability of a Sudden Stop crucially depend on the degree of DLD. Low values of the unleveraged absorption

[7] For EMs, the aggregate EMBI spread was used (see Calvo et al., 2005).

[8] Models like that of Philippe Aghion et al. (2001) can rationalize this conjecture by combining incomplete pass-through from exchange rates to prices with liability dollarization.

[9] This includes tests on the EM subsample only, correcting for endogeneity between potential changes in relative prices and the latent variable behind Sudden Stop (e.g., capital inflows) using a Rivers-Vuong approach, and estimation of a linear probability model with fixed effects.

[10] See Calvo et al. (2004, fig. 4, panel A) for details.

of tradables (i.e., large potential changes in the real exchange rate) imply a higher probability of Sudden Stop, but this is particularly so for dollarized economies, indicating a strongly nonlinear balance-sheet effect. This finding highlights that economies with a low supply of tradable goods that are highly dollarized and are running high current account deficits are very vulnerable to Sudden Stops.[11]

II. Phoenix Miracles

A 3S can have devastating effects on output behavior in EMs. Focusing on a sample of 31 EMs integrated to world capital markets, we analyzed output contractions that occurred in the context of a 3S, for the period 1980–2004. We identified 33 contraction episodes, of which one-third were mild recessions and two-thirds output collapses, where collapses are defined as a contraction of 4.4 percent from peak to trough.[12] These results point to the strong association between 3S and output collapses in EMs, which, incidentally, are not run-of-the-mill contractions but, rather, collapses of severe magnitude—on average, of about 10 percent from peak to trough.

Strikingly, economies emerging from output collapses that occurred in the context of 3S exhibit a clear-cut pattern: (a) post-collapse recoveries tend to be steep, i.e., economic activity reaches its precrisis levels relatively quickly, on average less than three years following an output trough; and (b), they materialize with virtually no recovery in external or domestic credit, and a very weak recovery in investment. These characteristics constitute the core of what we characterize as Phoenix Miracles, that is, cases where output appears to rise from the ashes. Some of these features can be clearly seen for the average episode in Figure 2, panels A and B.

We tested for the significance of differences in investment, credit to the private sector, and the current account balance (all as a share of GDP) at different stages of the output phase, namely, precrisis peak, trough, and full-recovery

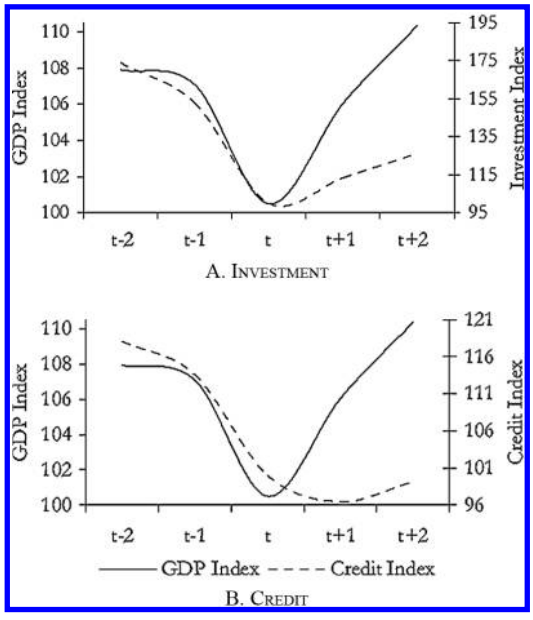

Figure 2. Investment and Credit in Emerging Markets

point.[13] Results are displayed in Table 1, and they confirm that domestic credit, external credit, and investment collapse with output but fail to recover as output bounces back to full recovery. These features can be rationalized in a model with financial frictions, where firms can obtain short-term credit for working capital but cannot obtain long-term financing for physical capital.[14]

Such a surprising set of characteristics of post-collapse recoveries in EMs raises the question of whether one of the most studied episodes of output collapse, i.e., the Great Depression, shared these Phoenix Miracle–type elements during the recovery phase. The parallels are striking, but so are the differences, and both are quite revealing. The Great Depression is similar to that of EM post-collapse recoveries in that output recovery also materializes with virtually no recovery in domestic bank credit and a very weak recovery in investment. The Great Depression differs substantially from output

[11] For an illustration contrasting the cases of Argentina and Chile, see Calvo and Talvi (2005).

[12] This is the median of our sample, which includes both systemic and nonsystemic contractions.

[13] We perform the equivalent of a difference-in-means test by running a regression of individual country differences against a constant.

[14] See Calvo et al. (2005) for a partial equilibrium framework.

TABLE 1—SYSTEMIC COLLAPSE EPISODES: AVERAGE DIFFERENCES ALONG PRE-CRISIS PEAKS, TROUGHS, AND FULL RECOVERY POINTS

	Peak to trough	Trough to recovery	Peak to recovery
Investment/GDP	−34.23***	20.21***	−23.24***
	[4.202]	[6.551]	[5.030]
Credit/GDP	3.95	−20.01***	−16.77**
	[5.455]	[5.542]	[7.020]
Current account	5.706***	−1.545	4.161***
Balance/GDP	[1.689]	[1.078]	[1.359]

Notes: Standard errors in brackets. There are 22 episodes in each regression. Percentage differences for investment and credit, and differences in points of GDP for the current account balance.

* significant at 10 percent.

** significant at 5 percent.

*** significant at 1 percent.

collapses in EMs in two key respects, which are of the utmost importance for shedding light on the causes of output collapse.

First, the Great Depression exhibited price deflation during the contraction phase (a price decline of 17 percent from peak to trough) and reflation during the recovery phase. In sharp contrast, EMs exhibit inflation acceleration during the collapse phase (a price increase of 63 percent from peak to trough) and disinflation during the recovery phase. Second, during the Great Depression, real wages rose sharply during the contraction phase and declined during the recovery phase (but remained above their precrisis levels by the time of full recovery). In stark contrast, real wages in EMs decline very sharply during the contraction phase and remain depressed as the economy bounces back to full recovery (see Figure 3).

Leading explanations for the size and persistence of output contraction during the Great Depression have relied on nominal wage rigidities and Debt Deflation, as discussed in Irving Fisher (1933)—see also Ben S. Bernanke (1995). In the face of price deflation, nominal wage rigidities led to significant increases in real wages and unemployment, while nominal noncontingent financial contracts led to an increase in the real value of debt and financial distress.

The evidence from EM output collapses clearly suggests that nominal wage stickiness was not a key factor—thus increasing the plausibility of Fisher's Debt Deflation conjecture. In fact, Debt Deflation in EMs came under a new guise. Rather than stemming from the interaction between fixed, nominal financial contracts and price deflation, it was the result of the interaction between *Liability Dollarization*—a common feature in EMs—and sharp real currency depreciation. Under those circumstances, the output value of outstanding debt in the nontradables sector shows a dramatic increase, likely triggering financial distress.

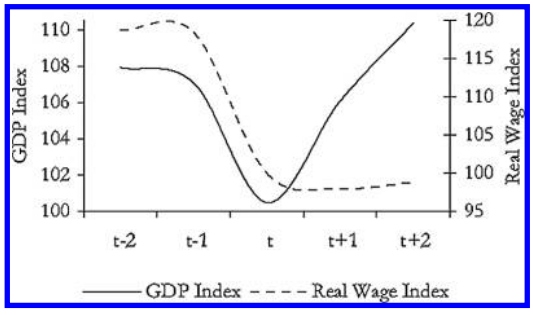

FIGURE 3. REAL WAGES IN EMERGING MARKETS

III. Closing Remarks

Systemic Sudden Stops are a major concern for EMs given that they come hand-in-hand with output collapse. Despite the seemingly effortless rise of the phoenix from its ashes—with little or no recovery in either investment or credit—the meltdown of the domestic banking system and massive contract repudiation that typically accompany these crises are likely to have costly long-run consequences. Identifying vulnerabilities affecting the likelihood of Systemic Sudden Stops, both external and domestic, as well as the long-run implications of these shocks, remain exciting open issues on the EM research agenda.

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