The Wake of Crises and Devaluations

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Assessing Financial Vulnerability: An Early Warning System for Emerging Markets
Notes from Chapter 7
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The preceding sections have predominantly focused on the antecedents of financial crises. Namely, the emphasis has been on the ability of a variety of indicators, including the credit ratings, to anticipate crises and characterize the extent to which a country is vulnerable. An application of the signals methodology to recent data also offered some insights as to where currency and banking sector problems may be brewing. In this section, we begin with the premise that, whether anticipated or not, financial crises occur and, once they do, policymakers and market participants become concerned about their consequences for economic activity. In light of Asia's recent woes, there is much speculation as to how long it will take those economies to recover from such destabilizing shocks and what the consequences for inflation over the near- and medium-term will be. In what follows, we review the historical experience in the aftermath of currency and banking crises. The emphasis is on assessing the economy's speed and capacity to return to "normal."

The recovery process

We next wish to assess how the various indicators we have stressed in our discussion behave following the financial crises and, in particular, how many months elapse before their behavior returns to normal. To do so, we must define what is "normal." In what follows, we

define periods of "tranquility" as the periods that exclude the 24 months before and after currency crises. In the case of banking crises, the 24 months before the banking crisis beginning and 36 months following it are excluded from tranquil periods. For each indicator, we tabulate its average behavior during "tranquil" periods. We then compare the post-crisis behavior of the indicator to its average in periods of tranquility.

Table 7.1 summarizes the results for that exercise for currency and banking crises separately, as we have stressed that banking crises have tended to be more protracted affairs. The number given is the average number of months that it takes that variable to reach its norm during tranquil periods. In parentheses, we note whether the level or growth rate of the variable remains above or below its norm in the post-crisis period.

Several features are worth noting. **First**, the analysis of the data does bear out that banking crises have more lingering deleterious effects on economic activity than currency crises. This is evident in several of the indicators. While the 12-month change in output remains below its norm in periods of tranquility for (on average) 10 months following the currency crash, it takes nearly twice that amount of time to recover following the banking crisis. This more sluggish recovery pattern is also evident in imports, which take about 2 ½ years to return to their norm. The weakness in asset prices, captured here by equity returns that are below the norm, persist for 30 months on average for banking crises, more than twice the time it takes to recover from a currency crash.

There are hypotheses that may explain the more protracted nature of the recovery following the banking crises. It is the case that the bulk of the banking crises in this sample were also accompanied by currency crises, and that the "twin" crises are more severe, as argued in Kaminsky and Reinhart (1996) and thus recovery is more sluggish. It may also be

Table 7.1 The aftermath of financial crises
(Average number of months it takes a variable to return to "normal" behavior after the crisis)[1]

Indicator	Banking crisis	Currency crisis
Bank deposits	30 (below)	12 (above)
Domestic credit/GDP[2]	15 (above)	9 (above)
Exports	20 (below)	8 (below)
"Excess" M1 balances	9 (above)	8 (below)
Imports	29 (below)	18 (below)
Lending-deposit rate ratio	0	3 (above)
M2 multiplier	7 (above)	21 (below)
M2/reserves	15 (above)	7 (above)
Output	18 (below)	10 (below)
Real exchange rate	8 (below-overvalued)	23 (above-undervalued)
Real interest rate[3]	15 (above)	7 (below)
Real interest rate differential	15 (above)	7 (below)
Stock prices	30 (below)	13 (below)
Terms-of-trade	4 (below)	9 (below)

[1] We note in parentheses whether the variable remained below or above the norm during periods of tranquility.
[2] Domestic credit/GDP remains above normal levels largely as a result of the decline in GDP following the crisis.
[3] The disparity between the post-crisis behavior of real interest rates lies in the fact that a large share of the currency crises occurred in the 1970s, when interest rates were controlled and not very informative about market conditions.

the case, and these hypotheses are not mutually exclusive, that a currency crisis may cut off external sources of funding, while a banking crisis cuts off both external and domestic sources of funding for households and firms. In other words, the credit crunch is more severe. A third possibility has to do with the distribution of crises across the sample. The currency crises are roughly evenly distributed between the pre- and post-liberalization periods, while the banking crises are bunched in the 1980s and 1990s. To the extent that crises have become more severe following deregulation, the slower pace of recovery in banking crises may reflect that. This is an

issue we will take up later.

Secondly, the table highlights that there are likely to be important sectoral differences in the pace of recovery, depending also on the type of crisis it is. For instance, following the devaluations that characterize the bulk of the currency crises, exports recover relatively quickly and ahead of the rest of the economy at large. However, following banking crises exports continue to sink for nearly two years following the onset of the crisis. This may be possibly due to a persistent overvaluation, high real interest rates, or a "credit crunch" story.

Table 7.2 The protracted nature of banking crises:
Time elapsed from beginning of crisis to its peak

Descriptive statistics	**Number of months**
Mean	19
Minimum	0
Maximum	53
Standard deviation	17

Source: Based on Kaminsky and Reinhart (1996).

Table 7.2 highlights the protracted nature of banking crises by showing the average number of months elapsed from the beginning of the crisis to its zenith for the 26 banking crises studied in the Kaminsky and Reinhart (1996) sample. Hence, on average it take a little over a year-and-a-half for a banking crisis to ripen; in some instances it has taken over four years. This protracted profile is, in part, due to the fact that often the financial sector problems do not begin with the major banks, but rather, with more risky finance companies. As the extent of leveraging rises, households and firms become more vulnerable to any adverse economic or political shocks

that lead to higher interest rates and lower asset values. Defaults increase and the problems spread to the larger institutions. If there are banks runs, such as in Venezuela in 1994, the spread to the larger institutions may take less time.

However, the information presented in Table 7.2 does not fully disclose the length of time that the economy may be weighed down by banking sector problems, as it does not provide information on the time elapsed between the crisis peak and its ultimate resolution. Rojas-Suarez and Weisbrod (1996), who examine the resolution of several banking crises in Latin America, highlight the sluggishness of the resolution process in many episodes. The Japanese banking crisis, which has spanned most of the 1990s and is ongoing, is a recent example of this sluggish recognition/admission/resolution process.

We next focus on the evolution in the aftermath of crises of two of the most closely followed macroeconomic indicators. Table 7.3 presents the time profile of pre- and post-crises GDP growth and inflation. We distinguish between the moderate inflation and high inflation countries; the latter encompass mostly Latin American countries. The numbers for all countries represent an average of the 89 currency crises in our sample.

While devaluations are usually perceived to be expansionary in industrial countries, this is reflected in the assumed policy trade-off in many second generation models of currency crises, which stress the policymakers conflict between the credibility losses incurred if the peg is abandoned and the economic gains from devaluation. This may be an adequate representation for industrial countries--witness the sharp recovery in the United Kingdom following its floatation of the pound during the ERM crisis. However, as Table 7.2 highlights devaluations, at least those connected to currency crises do not appear to have a salutary effect on the economy.

There are numerous theoretical explanations for this phenomenon.[1]

Table 7.2 Inflation and growth in the aftermath of currency crises

Indicator	average of t-1 and t-2	t	t+1	t+2	t+3
Real GDP growth: all countries	3.3	1.0	1.8	3.1	2.9
Real GDP growth: moderate inflation countries[1]	3.5	2.1	2.4	3.3	4.0
Real GDP growth: high-inflation countries	3.0	-0.6	1.0	3.1	1.7
Inflation: moderate inflation countries	14.0	15.7	18.0	15.7	14.8
High inflation countries	270.9	732.8	394.8	707.4	964.7

[1] Moderate inflation countries are those with inflation rates below 100 percent in all years surrounding the crisis; high inflation countries are those in which inflation exceeded 100 percent in at least one year.

[1] See Lizondo and Montiel (1989) for a survey of the theoretical literature.

Typically, devaluations are associated with recessions which are manifested in either an outright contraction in output or a slowdown relative to trend. The recessions appear to be more severe among the high inflation countries. This may be because inflation itself has adverse effects on growth (see Fischer, 1993) or because high inflation countries may be even more deprived from access to international credit than their low inflation counterparts. The evidence presented in Cantor and Packer (1996a) does, indeed, show that credit ratings penalize high inflation. It takes about two years to return to the pre-crisis growth rate.

These results are further borne out by the existing empirical literature that has examined the consequences of devaluations. Table 7.3 presents a brief synopsis of the results that emerge from these papers. In most cases, devaluations are found to be contractionary, with its negative impact diminishing, usually, within two years.[2] Morley (1992) concludes that the reason some of the earlier studies which are largely focused on devaluations during the 1950s and 1960s find milder recessions and even positive output consequences is that many of those devaluation episodes occurred in the context of trade liberalization and exchange market reform--not in the context of balance of payments crises as most of the devaluations for the later sample. In this regard, greater weight has to be placed on the more recent episodes, if one wishes to infer what the implications for Asia are.

[2] See also Kamin and Rogers (1997) for an interesting analysis of the case of Mexico.

As to inflation, devaluations are, as predicted by theory, inflationary. Table 7.2 shows that inflation pick up in the two years following the devaluation in both moderate- and high-inflation countries. The increase is far more dramatic for high-inflation countries, where inflation remains at a substantially higher level following the crisis (usually because of recurring devaluations at an accelerating rate). For the moderate-inflation countries inflation returns to its pre-crisis rate in about three years. These patterns are consistent with those found by Borensztein and DeGregorio (1998) for their 19 devaluation episodes in low- and high-inflation countries. The results of the various empirical studies presented in Table 7.3 are fairly consistent in this regard. To summarize, devaluations are inflationary, the passthrough is incomplete (hence, these lead to real depreciations), and the inflationary consequences for moderate-inflation countries appear to disappear somewhere between two and three years following the devaluation.

Table 7.3. The wake of devaluations: A review of the literature

Study	Sample	Variables	Results
Borensztein and De Gregorio (1998)	1982-1994, 19 devaluation episodes, five of which are industrial countries	Inflation	About 1/4 of the devaluation is offset by higher inflation after 3 months, about 60 percent after two years. Except for Latin American cases, inflation returned to its pre-devaluation level in three years or less.
Cooper (1970)	1951-1970, 24 large devaluations	GDP	Devaluations are followed by either a recession or a reduction in the rate of growth. These output effects were, however, small.
Edwards (1986)	1965-1980, 12 developing countries	GDP	Regressing income on the real exchange rate while controlling for policy fundamentals, he finds a negative and significant coefficient on the real exchange rate in the first year, this was offset by positive coefficients later on. Long-run effect is neutral.
Edwards (1989)	1962-1982, 39 devaluations greater than 15 percent in 24 countries.	Inflation, GDP, current account as a share of GDP, change in net foreign assets/money	Inflation doubles, on average from about 8 percent to 16.7 percent one year after the crisis; net foreign assets/money fall by about 5 percent in the three years following the crisis.
Kamin (1988)	1953-1983, 50 to 90 devaluations in excess of 15 percent	Inflation, GDP, exports, imports, export prices, import prices, capital inflows, trade balance, reserves	The trade balance does not change much the year following the devaluation; import and export growth increase. Capital inflows and reserves are about the same at t+1 as in the year of the devaluation. Inflation increases the year of the devaluation then declines. GDP growth falls the year of the devaluation then recovers the following year.
Kiguel and Ghei (1993)	1950-1990, 33 devaluations in excess of 20 percent in low inflation countries.	Real exchange rate, inflation, GDP growth, exports/GDP, reserves/ imports, parallel premium.	About 60 percent of the devaluation is not eroded by increases in domestic prices. Inflation increases, on average by about 1 ½ percentage points between t+3 and t-1; growth increases by 1 percent in that same period; exports and reserves/imports also rise between t-1 and t+3; the parallel premium falls.
Krueger (1979)	1951-1970, 22 large devaluations.	GDP	As Cooper (1970), devaluations are followed by either a recession or a reduction in the rate of growth. These output effects were, however, small.
Morley (1992)	1974-1983, 28 devaluations in excess of 15 percent.	capacity utilization	After controlling for other fundamentals, the real exchange rate is found to have a negative and significant effect on capacity utilization for up to two years. He finds real devaluations are associated with sharp declines in investment.

Some caveats

The preceding discussion has suggested a "representative time profile" for the recovery process in the wake of currency and, to a lesser extent, banking crises. This "representative time profile" suggests growth will return to normal within two years of the crisis and the inflationary consequences of the devaluation will abate within three years. Yet, this pattern would hardly describe the recovery protracted process of many of the Latin American economies during the 1980s, even Chile's relatively more rapid recovery.[3]

Obviously, the speed at which the economy recovers will be heavily influenced by how policymakers respond to the crisis as well as be external conditions. The high level of international real interest rates in the 1980s (the highest levels since the 1930s) were hardly conducive to speeding the recovery process. In what follows, we will argue, as in Kaminsky and Reinhart (1998), that the severity of the crisis may also play an important role in determining the swiftness or sluggishness of the healing process. Furthermore, the 1997-98 crises in Asia are significantly more severe that the historical crises in that region. Hence, extrapolation from past patterns, if those patterns have changed, may be of limited use.

[3] Chile's inflation rate was in single digits when it abandoned its crawling peg policy in 1982.

To analyze this issue formally, we measure the severity of currency and banking crises as in Kaminsky and Reinhart (1996). For banking crises, the measure of severity is simply given by the cost of the bailout of the banking sector expressed as a share of GDP. For currency crises, we construct an index that gives equal weights to reserve losses and currency depreciation. This index is centered on the month of the currency crisis and it combines the percentage decline in foreign exchange reserves in the six months **prior** to the crisis, since reserve losses typically occur before the central bank capitulates and the depreciation of the currency in the six months **following** the abandonment of the existing exchange rate arrangement, be it a peg or a band. This latter component captures the magnitude of the currency meltdown.

Table 7.5 presents these measures of severity for the 76 currency crises and 26 banking crises in the Kaminsky-Reinhart sample. For the 1970-1994 sample currency and banking crises were far more severe in Latin America than elsewhere. The crises in East Asia, by contrast, were relatively mild and not that different by these metrics from the crises in the European countries that largely represent the "others" group. This divergence may also help explain the subpar performance of the high inflation countries during the recovery process (Table 7.2). The picture that emerges during 1995-1997 is distinctly different. The Latin American crises include those of Mexico and Argentina in late 1994 and early 1995. While the latter, did not devalue, it sustained major reserve losses associated with a series of bank runs that left the level of bank deposits by mid-March 1995 about 18-19 percent below their level prior to the devaluation of the Mexican peso.

Both in terms of this measure of the severity of the currency crisis, as well as the estimated costs of bailing out the banking sector, the severity of the Asian crises surpasses that of their Latin American counterparts in the 1990s and it is a significant departure from its historic regional norm. Hence, to the extent that the initial virulence of the disease influences the speed of the healing process, the recovery for Asia may be more protracted or more anemic than the historic norm.

Table 7.5 The severity of crises: Then and now

	Currency crises			Banking crises		
Period	**Latin America**	**East Asia**	**Others**	**Latin America**	**East Asia**	**Others**
1970-1994	48.1	14.0	9.0	21.6	2.8	7.3
1995-1997	25.4	40.0	N.A.	8.3	15.0	N.A.

Source: Kaminsky and Reinhart (1998a).

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APPENDIX A: DATA AND DEFINITIONS

Crisis index: The index is a weighted average of exchange rate and reserve changes, with weights such that the two components of the index have equal conditional volatilities. Since changes in the exchange rate enter with a positive weight and changes in reserves have a negative weight attached, readings of this index that were three standard deviations or more above the mean were cataloged as crises. For countries in the sample that had hyperinflation, the construction of the index was modified. While a 100 percent devaluation may be traumatic for a country with low-to-moderate inflation, a devaluation of that magnitude is commonplace during hyperinflations. A single index for the countries that had hyperinflation episodes would miss sizable devaluations and reserve losses in the moderate inflation periods, since the historic mean is distorted by the high-inflation episode. To avoid this, we divided the sample according to whether inflation in the previous six months was higher than 150 percent and then constructed an index for each subsample. Our cataloging of crises for these countries coincides fairly tightly with our chronology of currency market disruptions. Eichengreen, Rose, and Wyplosz (1995) also include interest rates in this index, however, our data on market-determined interest rates for developing countries does not span the entire sample.

The indicators:

Sources: International Financial Statistics (IFS), International Monetary Fund; Emerging Market Indicators, International Finance Corporation (IFC); World Development Indicators, the World Bank, when data was missing from these sources, central bank bulletins and other country-specific sources were used as supplements. Unless otherwise noted, we used **12-month percent changes**.

1. M2 multiplier: The ratio of M2 to base money, (IFS lines 34 plus 35) divided by IFS line 14.

2. Domestic credit/nominal GDP: IFS line 52 divided by IFS line 99b (interpolated). Monthly nominal GDP was interpolated from annual or quarterly data.

3. Real interest rates on deposits: IFS line 60l, monthly rates, deflated using consumer prices (IFS line 64) expressed in percentage points.

4. The ratio of lending rates to deposit rates: IFS line 60p divided by IFS line60l; was used in lieu of differentials to ameliorate the distortions caused by the large percentage point spreads observed during high inflation. In levels.

5. "Excess" real balances: M1 (IFS line34) deflated by consumer prices (IFS line 64) less an estimated demand for money. The demand for real balances is determined by real GDP (interpolated IFS line99b), domestic consumer price inflation, and a time trend. Domestic inflation was used in lieu of nominal interest rates, as market-determined interest rates were not available during the entire sample for a number of countries; the time trend (which can enter log-linearly, linearly, or exponentially) is motivated by its role as a proxy for financial innovation and/or currency substitution. Excess money supply (demand) during pre-crisis periods (mc) is reported as a percent relative to excess supply (demand) during tranquil times (mt)--that is, 100 x (mc-mt)/mt.

6. M2 (in US dollars)/reserves (in US dollars): IFS lines 34 plus 35 converted into dollars (using IFS line ae) divided by IFS line 1L.d.

7. Bank deposits: IFS line 24 plus 25.

8. Exports (in US dollars): IFS line 70.

9. Imports (in US dollars): IFS line 71.

10. The terms of trade: the unit value of exports (IFS line 74) over the unit value of imports

(IFS line 75). For those developing countries where import unit values (or import price indices) were not available, an index of prices of manufactured exports from industrial countries to developing countries was used.

11. The real exchange rate: This measure used is based on consumer price indexes (IFS lines 64) and is defined as the relative price of foreign goods (in domestic currency) to the price of domestic goods. If the central bank of the home country pegs the currency to the dollar (Deutsche mark), the relevant foreign price index is that of the United States (Germany). Hence, for all the European countries the foreign price index is that of Germany while for all the other countries, consumer prices in the United States were used. The trend was specified as, alternatively, log-linear, linear, and exponential; the best fit among these was selected on a country-by-country basis. Deviations from trend during crisis periods (dc) were compared to the deviations during tranquil times (dt) and are shown in Figures 2 and 3 as a percent of the deviations in tranquil times (i.e.,100 x (dc-dt)/dt).

12. Reserves: IFS line 1L.d**.**

13. Domestic-foreign interest rate differential on deposits: Monthly rates in percentage points. IFS lines 60l. Interest rates in the home country are compared with interest rates in the United States (Germany) if the domestic central bank pegs the currency to the dollar (Deutsche mark). The real interest rate is given by $100 \times [((1+ i_t)p_t / p_{t+1-1}]$.

14. Output: For most countries, the measure of output used is industrial production (IFS line 66). However, for some countries (the commodity exporters) an index of output of primary commodities is used (IFS lines 66aa).

15: Stock returns (in dollars): IFC global indices are used for all emerging markets; for industrial countries the quotes from the main bourses are used.

16. Overall budget balance/GDP: Consolidated public sector balance as share of nominal GD