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Financial Crises: Characteristics and Indicators of Vulnerability

The financial crises that erupted in east Asia in the second half of 1997 are the latest in a series of such episodes that have been experienced by economies in various regions of the world in recent years. In the 1990s, currency crises have occurred in Europe (the 1992–93 crises in the European Monetary System’s exchange rate mechanism, ERM), Latin America (the 1994–95 “tequila crisis”), as well as in east Asia (the 1997–98 crises in Indonesia, Korea, Malaysia, the Philippines, and Thailand). These crises have been costly in varying degrees—and particularly so where banking sector problems have been involved—both in lost output and in the fiscal and quasi-fiscal outlays to shore up fragile financial sectors. Also, they have involved significant international spillovers and in a number of cases have required international financial assistance to limit their severity and costs and to contain their contagious spread and spillovers to other countries.

Financial crises are not unique to current financial systems, of course; history is replete with banking and exchange rate crises.⁷⁷ In this century, for instance, there were the numerous financial crises of the interwar period; the sterling and French franc crises of the 1960s; the breakdown of the Bretton Woods system in the early 1970s; and the debt crisis of the 1980s. Earlier periods, too, were peppered with financial crises, especially banking crises—two notable examples were the Barings Crisis of 1890, which bears striking parallels to the Mexican crisis of 1994–95,⁷⁸ and the U. S. exchange rate crisis of 1894–96, which has been seen as a speculative attack on the United States’ adherence to the gold standard and as an early example of the effectiveness of official borrowing of international reserves to stem a cur-

rency crisis.⁷⁹ Indeed, it was largely in response to various crises that modern institutions and practices such as the lender-of-last-resort function of central banks, deposit insurance, prudential and regulatory standards, and international financial arrangements—especially the IMF itself—were established and evolved.

Not only are financial crises not a recent phenomenon, but many of the same forces have often been at work in different crises. Financial innovations and the increased integration of global financial markets in the past two decades or so, however, do appear to have introduced some new elements and concerns, so that despite some similarities, crises in recent years have differed from those in the more distant past in important respects. In particular, the spillover effects and the contagious spread of crises seem to have become both more pronounced and far reaching.

This chapter analyzes financial crises in the post-Bretton Woods period, with a view to drawing lessons about their causes, their macroeconomic characteristics, and early warning signals of vulnerability to them. The analysis considers the experience of both developing and industrial countries; for the developing countries, the focus is on emerging market economies—that is, on economies that have been significant recipients of private capital flows and thus are potentially susceptible to shifts in market sentiment.

Types of Crises

A number of broad types of economic or financial crisis can be distinguished. A *currency crisis* may be said to occur when a speculative attack on the exchange value of a currency results in a devaluation (or sharp depreciation) of the currency, or forces the authorities to defend the currency by expending large volumes of international reserves or by sharply raising interest rates. A *banking crisis* refers to a situation in which actual or potential bank runs or failures induce banks to suspend the internal convertibility of their liabilities or which compels the government to inter-

⁷⁷See, for instance, Michael D. Bordo and Anna J. Schwartz, “Why Clashes Between Internal and External Stability Goals End in Currency Crises, 1797–1994,” *Open Economies Review*, Vol. 7 (Suppl. 1, 1996), pp. 537–68; and Charles P. Kindleberger, *Manias, Panics, and Crashes: A History of Financial Crises* (New York: Basic Books, 1978); and Annex VI, *International Capital Markets: Developments, Prospects, and Key Policy Issues* (Washington: IMF, November 1997), pp. 234–51.

⁷⁸See Barry Eichengreen, “The Baring Crisis in a Mexican Mirror,” CIDER Working Paper C97–084 (Berkeley, California: Center for International and Development Economics Research, University of California, February 1997).

⁷⁹See Vittorio Grilli, “Managing Exchange Rate Crises: Evidence from the 1890s,” *Journal of International Money and Finance*, Vol. 9 (September 1990), pp. 258–75.

vene to prevent this by extending assistance on a large scale.⁸⁰ A banking crisis may be so extensive as to assume systemic proportions. *Systemic financial crises* are potentially severe disruptions of financial markets that, by impairing markets' ability to function effectively, can have large adverse effects on the real economy. A systemic financial crisis may involve a currency crisis, but a currency crisis does not necessarily involve serious disruption of the domestic payments system and thus may not amount to a systemic financial crisis. Finally, a *foreign debt crisis* is a situation in which a country cannot service its foreign debt, whether sovereign or private.

Crises of all types have often had common origins: the buildup of unsustainable economic imbalances and misalignments in asset prices or exchange rates, often in a context of financial sector distortions and structural rigidities. A crisis may be triggered by a sudden loss of confidence in the currency or banking system, prompted by such developments as a sudden correction in asset prices, or by disruption to credit or external financing flows that expose underlying economic and financial weaknesses. Crises may involve sharp declines in asset prices, and failures of financial institutions and nonfinancial corporations.⁸¹ Of course, not all corrections of imbalances involve a crisis. Whether they do or not depends, apart from the magnitude of the imbalances themselves, on the credibility of policies to correct the imbalances and achieve a "soft landing," and on the robustness of the country's financial system. These factors together determine the economy's vulnerability to crises. Crises may then be considered to be the consequence of financial or economic disturbances when economies suffer from a high degree of vulnerability.

⁸⁰This definition follows Michael D. Bordo, "Financial Crises, Banking Crises, Stock Market Crashes, and the Money Supply: Some International Evidence, 1870–1933," in Forrest Capie and Geoffrey Wood, eds., *Financial Crises and the World Banking System* (New York: St. Martin's, 1985); Gerard Caprio, Jr., and Daniela Klingebiel, "Banking Insolvency: Bad Luck, Bad Policy, or Bad Banking," in World Bank, *Annual World Bank Conference on Development Economics 1996* (Washington, 1997); and Barry Eichengreen and Andrew K. Rose, "Staying Afloat When the Wind Shifts: External Factors and Emerging-Market Banking Crises," NBER Working Paper 6370 (Cambridge, Massachusetts: National Bureau of Economic Research, January 1998).

⁸¹Not all financial disturbances that produce falling asset prices and wealth losses to particular economic sectors or agents—such as those associated with a collapse of land prices following a boom, or the bursting of bubbles in various asset markets—are to be viewed as true financial crises. Financial disturbances that do not impinge on the payments mechanism and do not have potentially damaging consequences for economic activity have been characterized as "pseudo-financial crises"—see Anna J. Schwartz, "Real and Pseudo-Financial Crises," in Capie and Wood, *Financial Crises and the World Banking System*; and Frederic S. Mishkin, "Preventing Financial Crises: An International Perspective," NBER Working Paper 4636 (Cambridge, Massachusetts: National Bureau of Economic Research, June 1994).

At times elements of currency, banking, and debt crises may be present simultaneously, as in the recent east Asian crisis and in the 1994–95 Mexican crisis. The 1992–93 ERM crises were essentially currency crises, although the Nordic countries that experienced currency crises also had domestic banking crises at around the same time. Furthermore, what may start out as one type of crisis may develop into others as well. Banking crises have often preceded currency crises, especially in developing countries—for instance, in Turkey and Venezuela in the mid-1990s. Banking problems have preceded debt crises, too, as in Argentina and Chile in 1981–82. The converse has also occurred, as in Colombia, Mexico, Peru, and Uruguay, where the withdrawal of external financing in 1982 precipitated banking crises. More recently, what began as currency crises in some east Asian countries metastasized into banking and debt crises, as illustrated most clearly by Indonesia. That one type of crisis precedes another does not necessarily imply causality, however. Banking sector difficulties may not always be apparent, especially in poorly supervised and inadequately regulated systems, or in circumstances where lending booms and asset price inflation may mask banking problems until a correction in asset prices exposes the fragility of the financial system. The same is true for problems linked to corporate sector indebtedness. In these situations, the fragility of the banking system or the corporate sector may be fully revealed only after a run on the currency has undermined confidence more generally and precipitated speculative shifts that expose and exacerbate banking and debt problems.⁸² This has clearly been a feature of the recent east Asian crisis.

Identifying Crises

What has been the incidence of currency and banking crises in emerging market economies and in industrial countries in the past two decades or so? Has there been any tendency for one type of crisis to become more or less prevalent? And what have been the costs of financial crises? To answer these questions, operational criteria to identify currency and banking crises are needed. The measurement and dating of both exchange market and banking crises pose various difficulties. In this chapter, following procedures adopted in the economic literature, episodes of significant foreign exchange market pressures are identified and dated using statistical criteria. This approach, while capturing the more serious currency crises, also picks up episodes where there were significant but less than

⁸²For more in-depth discussions of related banking sector issues, see Carl-Johan Lindgren, Gillian Garcia, and Matthew I. Saal, *Bank Soundness and Macroeconomic Policy* (Washington: IMF, 1996).

critical foreign exchange market pressures, and it makes the results sensitive to the statistical criteria used. This must be borne in mind in interpreting the results and drawing inferences of general applicability.

A currency crisis could be identified simply as a substantial nominal currency devaluation.⁸³ This criterion, however, would exclude instances where a currency came under severe pressure but the authorities successfully defended it by intervening heavily in the foreign exchange market, or by raising interest rates sharply, or by other means. An alternative approach is to construct an index of speculative pressure that takes into account not only exchange rate changes, but also movements in international reserves or interest rates that absorb pressure and thus moderate the exchange rate changes.⁸⁴ Crises identified by using such an index would therefore include not only those occasions in which the currency depreciated significantly, but also occasions where actions by the authorities averted a large devaluation or the abandonment of an exchange rate peg.

Banking crises are more difficult to identify empirically, partly because of the nature of the problem and partly because of the lack of relevant data. Although data on bank deposits are readily available for most countries, and thus could be used to identify crises associated with runs on banks, most major banking problems in recent years have not originated on the liabilities side of banks' balance sheets. Thus, among the industrial countries, neither the banking crises in Finland, Norway, and Sweden in the late 1980s and early 1990s, nor the earlier banking problems in several other countries, such as in Spain in the early 1980s, nor the more recent banking problems in Japan were associated with runs on deposits. Among the developing countries, large withdrawals of deposits and runs on banks have been more frequent—for instance, the banking crises in the 1980s and 1990s in Argentina, the Philippines, Thailand, Turkey, Uruguay, and Venezuela were associated with bank runs. A failure to roll over interbank deposits, as in Korea recently, can have results similar to those of a run on banks. Instances of

large deposit withdrawals, however, as in the recent financial crisis in Indonesia, have tended to follow the disclosure of difficulties on the assets side or widespread uncertainty about whether the currency would maintain its value. In general, runs on banks are the result rather than the cause of banking problems.

Banking crises generally stem from the assets side of banks' balance sheets—from a protracted deterioration in asset quality. This suggests that variables such as the share of nonperforming loans in banks' portfolios, large fluctuations in real estate and stock prices, and indicators of business failures could be used to identify crisis episodes. The difficulty is that data for such variables are not readily available for many developing countries or are incomplete (as with data on nonperforming loans in many countries). In cases where central banks have detailed information on nonperforming loans, it is usually laxity in the analysis of, and in follow-up action in response to, the data that allows the situation to deteriorate to the point of crisis.

Given these limitations, banking crises have usually been dated by researchers on the basis of a combination of events—such as the forced closure, merger, or government takeover of financial institutions, runs on banks, or the extension of government assistance to one or more financial institutions—or in-depth assessments of financial conditions, as in many case studies.

For the analysis that follows, currency and banking crises were identified for a group of over 50 countries for the period 1975–97.⁸⁵ An index of foreign exchange market pressure was constructed as a weighted average of (detrended) monthly exchange rate changes and reserve changes. Occasions when values of the index exceeded a specified threshold were classified as crises.⁸⁶ Banking crises were compiled from previous

⁸³Jeffrey A. Frankel and Andrew K. Rose, "Currency Crashes in Emerging Markets: Empirical Indicators," NBER Working Paper 5437 (Cambridge, Massachusetts: National Bureau of Economic Research, January 1996), define a "currency crash" as a nominal depreciation of the currency of at least 25 percent in a year, along with a 10 percent increase from the previous year in the rate of depreciation. The latter condition is included so as to omit from currency crashes the large trend depreciations of high-inflation countries.

⁸⁴See, for example, Barry Eichengreen, Andrew K. Rose, and Charles Wyplosz, "Contagious Currency Crises: First Tests," *Scandinavian Journal of Economics*, Vol. 98 (No. 4, 1996), pp. 463–84, in which a weighted average of changes in the exchange rate, foreign reserves, and interest rates relative to Germany (the reference country) is used to examine currency crises in industrial countries. Crises are identified as extreme values of the speculative pressure index.

⁸⁵The group included 22 industrial countries and 31 developing countries. The developing country group consisted mainly of countries commonly referred to as emerging market countries. Germany and the United States were excluded from the currency crisis sample (but included in the banking crisis sample) because they were the reference countries for the European and the non-European countries, respectively. Hong Kong SAR also was excluded in the currency crisis sample because of the lack of monthly data. Currency crises were analyzed using monthly data, while banking crises were analyzed using annual data.

⁸⁶The weights were chosen so as to equalize the variance of the two components, thus avoiding the possibility of one of the two components dominating the index. Interest rates were not included in the index, owing to the paucity of comparable, market-determined interest rate data for many developing countries over the sample period. The threshold was set to 1.5 times the pooled standard deviation of the calculated index plus the pooled mean of the index. Weights and thresholds were calculated separately for periods with low and high inflation, where the latter were defined as 12-month inflation rates greater than 80 percent. For any one country, crises identified within 18 months of a previous crisis were considered as part of the earlier crisis and excluded. For information about a similar index, see Eichengreen, Rose, and Wyplosz, "Contagious Currency Crises."

studies.⁸⁷ On this basis, between 1975 and 1997 158 episodes in which countries experienced substantial exchange market pressures (hereafter referred to as currency crises), and 54 banking crises, were identified.⁸⁸ In 55 of the currency crises, the exchange rate component of the index accounted for more than 75 percent of its overall value. These episodes were denoted currency “crashes.” The foreign reserves component accounted for 75 percent of the overall index in another 55 instances. Cases in which more than one country was affected by a crisis, either because of a common shock or because of contagion effects, were counted as more than one crisis. For instance, the recent east Asian financial crisis comprised five currency crises.⁸⁹ Several interesting points emerge from the data.

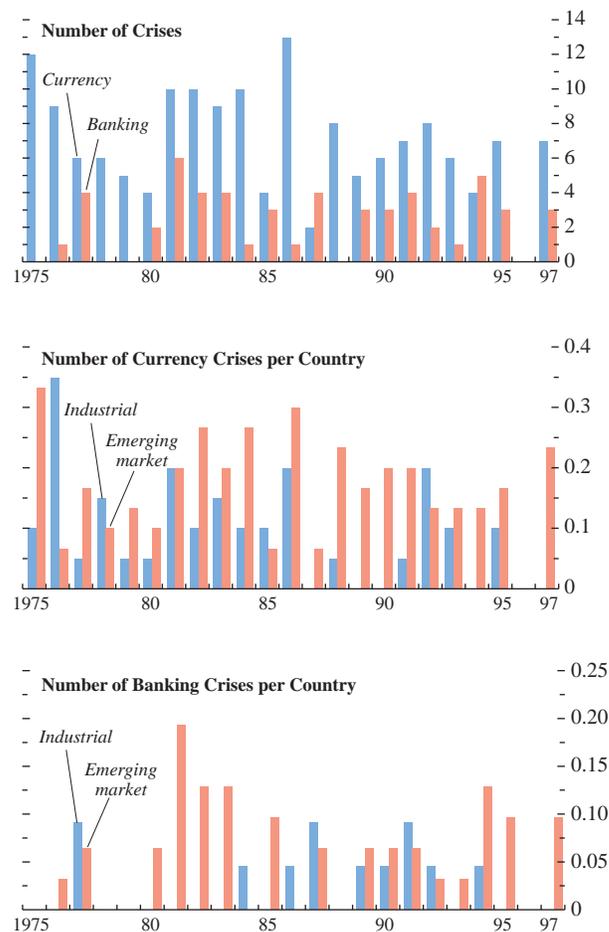
On the basis of the operational criteria used in this study, currency crises were relatively more prevalent in the first half of the sample period (1975–86) than in the second half (1987–97). The number of currency crises was particularly high in the mid-1970s (a period of large external shocks to many countries) and in the early to mid-1980s (Latin American debt crises) (Figure 25). Banking crises, in contrast, were somewhat more prevalent in the second half of the sample period, reflecting an increased incidence since the early 1980s, possibly related to the financial sector liberalization that occurred in many countries during this period.

In comparing industrial and emerging market countries, it appears that industrial countries had fewer currency and banking crises than emerging market countries during the sample period (see Figure 25). The incidence of currency crises in emerging market countries was double that in industrial countries, while the incidence of banking crises in emerging market countries was more than twice that in industrial countries. It also appears that most of the industrial country currency crises occurred in the first half of the sample period, while most of the industrial country banking crises occurred in the second half. For emerging market countries, the frequency of currency crises shows

Figure 25. Incidence of Currency and Banking Crises¹

(Number of crises)

For emerging market economies, the frequency of currency crises shows no discernible trend, while banking crises are clustered in the early 1980s and the 1990s.



Sources: See footnotes 86 and 87 in the text.

¹A date and country pair was identified as a crisis when a weighted average of detrended monthly percent changes in exchange rates and (negative) detrended monthly percent changes of foreign reserves exceeded a threshold value. Weights were calculated so that the conditional variance of the two components of the index were equal. Trends were country specific. The threshold was set to 1.5 times the pooled standard deviation of the calculated index plus the pooled mean of the index. Weights and thresholds were calculated separately for time periods with low and high inflation, where the latter was defined as 12-month inflation rates greater than 80 percent. A crisis identified within 18 months of a previous crisis in the same country was considered as part of the earlier crisis and was excluded.

⁸⁷The list of banking crises was compiled from Gerard Caprio, Jr., and Daniela Klingebiel, “Bank Insolvencies: Cross-Country Experience,” Policy Research Working Paper 1620 (Washington: World Bank, July 1996); Graciela L. Kaminsky and Carmen M. Reinhart, “The Twin Crises: The Causes of Banking and Balance-of-Payments Problems,” International Finance Discussion Paper 544 (Washington: Board of Governors of the Federal Reserve System, March 1996); and Asli Demirgüç-Kunt and Enrica Detragiache, “The Determinants of Banking Crises: Evidence from Developing and Developed Countries,” Working Paper 97/106 (Washington: IMF, September 1997).

⁸⁸Other studies have identified a similar number of currency crises, controlling for differences in sample size. For example, Kaminsky and Reinhart, “The Twin Crises,” found 71 crises for 20 countries between 1970 and mid-1995; Eichengreen, Rose, and Wyplosz, “Contagious Currency Crises,” identified 77 crises for 20 industrial countries during 1959–1993, using quarterly data.

⁸⁹The five crises identified by the index were the crises in Indonesia, Korea, Malaysia, Philippines, and Thailand.

no marked trend, while banking crises are clustered in the early 1980s and the 1990s.

Given that the two types of crises may have common origins, or that one type of crisis may induce the other, it is not surprising that countries appear to have banking and currency crises at around the same time. In these instances, banking crises preceded currency crises more often than the other way around. With the timing of crises identified on an annual basis, banking crises led currency crises by one year on 13 occasions, and by two years on 10 other occasions. The crises were contemporaneous in 12 instances.⁹⁰ Currency crises preceded banking crises by one year only seven times and by two years another four times. This evidence, while suggestive, should be interpreted with caution in view of the difficulties in dating the beginning of banking crises.⁹¹

Financial crises can be very costly, both in the fiscal and quasi-fiscal costs of restructuring the financial sector and, more broadly, in the effect on economic activity of the inability of financial markets to function effectively (Table 14).⁹² Resolution costs for banking crises have in some cases reached over 40 percent of GDP (for example, in Chile and Argentina in the early 1980s), while nonperforming loans have exceeded 30 percent of total loans (for example, in Malaysia during 1988 and for state banks in Sri Lanka during the early 1990s).⁹³ In general, the resolution costs of banking crises have been higher in emerging market countries than in industrial countries: except for Spain, resolution costs in industrial countries have been held to under 10 percent of GDP, whereas in several emerging market countries, particularly in Latin America, resolution costs have been much larger (Box 6).⁹⁴

⁹⁰Currency and banking crises seem to have become more contemporaneous since the late 1980s: 10 of the 12 instances in which banking and currency crises occurred in the same year have taken place since 1989.

⁹¹It should be noted that others have found evidence that banking crises are statistically significant in helping to predict currency crises, but not conversely—see Kaminsky and Reinhart, “The Twin Crises.”

⁹²The costs of banking crises were compiled from Caprio and Klingebiel, “Bank Insolvencies: Cross-Country Experience”; Claudia Dziobek and Ceyla Pazarbasioglu, “Lessons from Systemic Bank Restructuring: A Survey of 24 Countries,” Working Paper 97/161 (Washington: IMF, December 1997); Liliana Rojas-Suarez and Steven R. Weisbrod, “Banking Crises in Latin America: Experiences and Issues,” in *Banking Crises in Latin America*, Ricardo Hausmann and Liliana Rojas-Suarez, eds., (Washington: Inter-American Development Bank, 1996); and Bank for International Settlements, *66th Annual Report* (Basle, Switzerland: BIS, June 1996).

⁹³The data on nonperforming loans should be regarded as indicative only of broad orders of magnitude. Comparisons across countries are difficult because of differences in the classification of loans as nonperforming. Often nonperforming loans are underreported, particularly at the beginning of a crisis.

⁹⁴However, since any resolution of a banking crisis generally involves some elements of net resource transfers among different groups in an economy, the fiscal costs associated with restructuring operations are likely to overstate the true welfare cost.

Table 14. Selected Crises: Costs of Restructuring Financial Sectors and Nonperforming Loans

Country	Years	Fiscal and Quasi-Fiscal Costs ¹	Nonperforming Loans ²
Argentina	1980–82	13–55	9
	1985	...	30
Brazil	1994–96	4–10	9
Chile	1981–85	19–41	16
Colombia	1982–87	5–6	25
Finland	1991–93	8–10	9
Indonesia	1994	2	...
Japan ³	1990s	3	10
Malaysia	1985–88	5	33
Mexico	1994–95	12–15	11
Norway	1988–92	4	9
Philippines	1981–87	3–4	...
Spain	1977–85	15–17	...
Sri Lanka	1989–93	9	35
Sweden	1991–93	4–5	11
Thailand	1983–87	1	15
Turkey	1982–85	3	...
United States	1984–91	5–7	4
Uruguay	1981–84	31	...
Venezuela	1980–83	...	15
	1994–95	17	...

Sources: See footnote 92 in the text.

¹Estimated in percent of annual GDP during the restructuring period. Where a range is shown, the lower estimate includes only costs of funds, credit, and bonds injected directly into the banking system, while the higher estimate includes other fiscal costs, such as exchange rate subsidies.

²Estimated at peak of nonperforming loans in percent of total loans. Measure is dependent on country definition of nonperforming loans.

³Cost estimates through 1995 only. Official estimates of the costs, which take into account the costs of settling housing loan corporations (“Jusen”), and of nonperforming loans are 0.14 percent and 3 percent, respectively.

In addition to their fiscal and quasi-fiscal costs, banking and currency crises may also lead to misallocation and underutilization of resources, and thus to losses of real output. In some instances, however, crises may not lead to output losses, such as when a crisis simply brings about a needed correction of a misaligned exchange rate. To provide a rough assessment of the costs in terms of lost output, GDP growth after a crisis was compared with trend GDP growth. The cost in lost output was then estimated by adding up the differences between trend growth and actual growth in the years following the crisis until the time when annual output growth returned to its trend. For approximately 40 percent of the currency crises and 20 percent of the banking crises, there were no significant

Table 15. Costs of Crises in Lost Output Relative to Trend

	Number of Crises	Average Recovery Time ¹ (in years)	Cumulative Loss of Output per Crisis ² (in percentage points)	Crises with Output Losses ³ (in percent)	Cumulative Loss of Output per Crisis with Output Loss ⁴ (in percentage points)
Currency crises	158	1.6	4.3	61	7.1
Industrial	42	1.9	3.1	55	5.6
Emerging market	116	1.5	4.8	64	7.6
Currency crashes⁵	55	2.0	7.1	71	10.1
Industrial	13	2.1	5.0	62	8.0
Emerging market	42	1.9	7.9	74	10.7
Banking crises	54	3.1	11.6	82	14.2
Industrial	12	4.1	10.2	67	15.2
Emerging market	42	2.8	12.1	86	14.0
Currency and banking crises⁶	32	3.2	14.4	78	18.5
Industrial	6	5.8	17.6	100	17.6
Emerging market	26	2.6	13.6	73	18.8

¹Average amount of time until GDP growth returned to trend. Because GDP growth data are available for all countries only on an annual basis, by construction the minimum recovery time was one year.

²Calculated by summing the differences between trend growth and output growth after the crisis began until the time when annual output growth returned to its trend and by averaging over all crises.

³Percent of crises in which output was lower than trend after the crisis began.

⁴Calculated by summing the differences between trend growth and output growth after the crisis began until the time when annual output growth returned to its trend and by averaging over all crises that had output losses.

⁵Currency “crashes” are identified by crises where the currency component of the exchange market pressure index accounts for 75 percent or more of the index when the index signals a crisis.

⁶Identified when a banking crisis occurred within a year of a currency crisis.

output losses estimated using this technique.⁹⁵ For the currency crises, on average, output growth returned to trend in a little over one and one-half years, and the cumulative loss in output growth per crisis was 4¼ percentage points (relative to trend) (Table 15).⁹⁶ For “severe” currency crises, the recovery time and cumulative loss of output growth per currency crisis increases to two and one-quarter years and 8¼ percentage points, respectively.⁹⁷

Banking crises, not surprisingly, were more prolonged and more costly than currency crises: on average it took three years for output growth to return to trend, and the average cumulative loss in output growth was 11½ percentage points.⁹⁸ Although this

⁹⁵This may be because in some cases it takes several years for the consequences of financial sector weaknesses to materialize.

⁹⁶This cost estimate may be biased downward because instances where output growth did not return to trend over the sample period were excluded from the calculation.

⁹⁷“Severe” currency crises are identified by increasing the threshold for the exchange market pressure index to three times the pooled standard deviation plus the pooled mean.

⁹⁸This should be viewed only as indicative of the macroeconomic costs associated with banking crises and not as suggesting that the banking crises caused these output losses. Recessions may give rise to banking crises, which then amplify the recessions. Furthermore the magnitude of output losses for different countries may depend on their specific cyclical positions before the crisis. It is, in principle, possible to derive output losses correcting for each country’s cyclical position, but, since the cyclical positions of the 50 countries in the sample have not been closely synchronized, the effect of the correction on average losses will be limited.

may seem intuitively convincing, some caution is in order: the criteria used to identify banking crises may tend to select occasions when financial sector problems were severe, whereas the statistical criteria used to identify currency crises are independent of such judgments. When banking crises occurred within a year of currency crises, the losses were substantially larger, amounting to 14½ percent, on average. It is interesting to note that for both currency and banking crises the average recovery time was shorter in emerging market countries than in industrial countries, but the cumulative output loss was on average larger. The differences in recovery time and cumulative output losses may result, in part, from the higher mean and variance of output growth in emerging market countries compared with industrial countries.⁹⁹ These results are for the group of countries and time period used in the analysis in this chapter; results will obviously differ from case to case.

Origins of Currency and Banking Crises

The factors that underlie the emergence of imbalances and that render an economy vulnerable to finan-

⁹⁹The mean and standard deviation of output growth were 4.5 percent and 3.7 percent, respectively, for emerging market countries; they were 2.7 percent and 2.3 percent, respectively, for industrial countries.

Box 6. Resolving Banking Sector Problems

The resolution of widespread banking problems will usually require the adoption of a carefully designed financial sector restructuring strategy to restore confidence in the banking system and set it on a path that will return it to soundness and profitability. Typically, the strategy will entail the recapitalization and restructuring of a number of banks and the establishment for three key groups—bank owners and managers, creditors (including depositors), and bank supervisors—of the incentives and ability to monitor bank operations properly and ensure prudent bank management. Developing appropriate incentives for the three groups is especially critical to prevent recurrences of banking crises.¹

When banking difficulties first emerge, bank owners and managers, and public authorities, are often tempted to conceal their extent. The motivation of bank owners and managers will tend to be to retain their stake in, and control of, the bank. The primary concern of the authorities will be to maintain public confidence in the banking system, particularly given its vital economic role in financial intermediation and operation of the payments system. Furthermore, it is not always obvious at the outset whether banking difficulties are permanent or transitory. Large adverse macroeconomic shocks (such as a change in the terms of trade or a rise in interest rates) may temporarily affect even well-run banks. The effects of a loss of confidence in the banking system in the face of such shocks are difficult to predict and may be enormous and irreversible.

As a result, bank owners, bank managers, and public authorities may attempt to defer disclosing losses in the banking system. Banks, in order to conceal nonperforming loans and maintain the illusion of solvency, may extend new credits to bankrupt customers, sometimes even with the encouragement of the authorities, so that these customers can continue to service their outstanding debts. A delay in assessing losses, however, can ultimately lead to even larger losses as more funds are lent to businesses that may never return to profitability. In addition, bank

managers may be tempted to “gamble” by paying above-market interest rates to attract deposits and then on-lending these funds for high-risk, high-return projects, since they do not expect to bear the full consequences of their behavior (for example, because of limited liability, explicit or implicit deposit insurance, or expected government bailouts).

Studies of banking crises have shown, however, that countries that are quickest to diagnose the underlying problems, assess losses, and take measures to ensure macroeconomic stability and restructure their banking sectors are generally the most successful in recovering from the crises.² These measures involve correction of the policy weaknesses that may have contributed to the crisis. Several countries, such as Argentina, Chile, and the Philippines in the early 1980s, attempted to hide banking system losses by providing excessive financial support, often through the central bank. This policy eventually put pressure on the central bank to adopt an accommodative monetary policy stance and led to monetary expansion and high inflation. In other instances, excessively tight policies (resulting, for example, in a “credit crunch”) or inappropriate exchange rate regimes have exacerbated crises.

The measures needed to resolve problems in the banking system, however, are typically structural or microeconomic. The most urgent requirements are often to restructure bank balance sheets to address problem loans, and to restore financial viability and confidence in the banks. Countries have taken alternative approaches to this process, although in most cases some temporary government financial support of distressed banks has been unavoidable, since the magnitude of the losses could not be covered by the private sector in a timely manner. In several countries, the central bank has taken the lead by assuming extensive responsibilities, including financial support and bank and asset (nonperforming loan) management. In other countries, the central bank has played a much more limited role, simply providing short-term

¹The issues involved in restructuring strategies are complex and cannot be examined fully in a few pages. This box touches on only some of the issues. For a more extensive discussion, see Carl-Johan Lindgren, Gillian Garcia, and Matthew I. Saal, *Bank Soundness and Macroeconomic Policy* (Washington: IMF, 1996); and Charles Enoch and John H. Green, eds., *Banking Soundness and Monetary Policy: Issues and Experiences in the Global Economy* (Washington: IMF, 1997).

²For example, Claudia Dziobek and Ceyla Pazarbasioglu, “Lessons from Systemic Bank Restructuring: A Survey of 24 Countries,” Working Paper 97/161 (Washington: IMF, December 1997), found that countries that made substantial progress in restructuring their banking sectors began to take measures, on average, in less than 10 months after banking problems surfaced, while countries that made slow progress waited over 40 months.

cial disturbances may be grouped under the following (not mutually exclusive) headings: unsustainable macroeconomic policies, weaknesses in financial structure, global financial conditions, exchange rate misalignments, and political instability. In addition, there is a natural tendency for economic activity to fluctuate, giving rise to shifts in market sentiment that can con-

tribute to stresses in the financial system. These factors make up the conditions under which crises occur and should be distinguished from the proximate causes (or triggers) of crises, which are usually events or news that lead economic agents to reassess their positions.

Macroeconomic instability has been an important underlying factor in many financial crises. In many

liquidity. Sweden, for instance, placed strict limits on central bank financing when systemic banking problems arose.³ Experience suggests that, generally, the smaller the role of the central bank, the more progress the country makes in bank restructuring, mainly because direct central bank involvement can create conflicts with monetary policy objectives.⁴

Countries in which the central bank did not take a direct role in recapitalizing banks often used an independent agency to lead the restructuring efforts. These agencies implemented firm exit policies, closed or merged insolvent banks, facilitated loss-sharing between the state, the banks, and the public, and helped solvent banks to sell bonds or equity in exchange for nonperforming loans. These agencies can be established to manage a particular crisis (for example, the Resolution Trust Corporation in the United States), or to manage bank restructuring cases on an ongoing basis (a role the Federal Deposit Insurance Corporation plays in the United States).

Failing to actively manage the nonperforming assets of all banks, as well as the remaining assets of failed banks, increases the total cost of restructuring. It also creates an inequitable distribution of losses by rewarding defaulters and by impairing incentives for debt repayment in the future. Liquidation may be necessary in some cases, but loan or debt restructuring may be the least costly alternative under certain conditions. Mass liquidation, in particular, could result in asset price deflation, exacerbating a country's macroeconomic difficulties. Loan workout units, decentralized or centralized, which are actively managed to maximize returns and maintain asset values, can contribute to the recovery of bank restructuring costs and send the appropriate signals to delinquent borrowers.⁵

In instances where difficulties were concentrated in state-owned banks, the problem banks were sometimes

privatized. The design of privatization programs is very important in these situations. Poorly designed programs can contain the seeds of subsequent banking crises. In some such cases, preferences were given to certain bidders, banks assets were overpriced, and weak legislation allowed nonbank conglomerates to acquire large portions of the financial system.

Once recapitalization has commenced, the operational performance of banks must be improved by creating the appropriate incentives for bank owners, bank managers, supervisors, and the market to monitor banks and ensure prudent corporate governance and bank profitability on an ongoing basis. In particular, shortcomings in the supervisory, regulatory, legal, and accounting frameworks and in excessive and distorted taxation schemes must be addressed. In Chile, for example, where restructuring made significant progress after the crises in the 1980s, managers were dismissed, shareholders bore losses, and fraud was prosecuted where it existed. Moreover, accounting rules and supervision were brought up to international standards, and banks were barred from lending to borrowers in default and are now required to be rated by private credit agencies at least twice a year.⁶ In Malaysia, a credit bureau was established so that banks can have better access to information about potential borrowers. New Zealand's market-oriented approach, which may not be readily applicable in every country, focuses on disclosure and incentives. In addition to their income and balance sheet statements, banks are required to disclose other information on a quarterly basis, including asset quality and provisioning, risk management systems, loan concentration, and credit ratings. Abbreviated disclosure statements must be posted in all banks, and full disclosure statements must be available on demand. Bank managers, moreover, must attest that the statements contain no misleading information and can be subject to criminal penalties and unlimited liability.⁷

³Central bank or other government funding may also be unavoidable when a systemic crisis leads to the imminent risk of runs on otherwise solvent banks. In this instance, a temporary blanket guarantee on bank liabilities may be required to stabilize bank funding (particularly, the deposit base).

⁴See Dziobek and Pazarbasioğlu, "Lessons from Systemic Bank Restructuring," for more details. The study also found, however, that in transition countries the central bank may need to take the lead in financial sector restructuring, given the scarcity of banking expertise in the public sector.

⁵In Sweden, the net fiscal cost of bank restructuring has been diminishing over time mainly because of the success in loan recovery by the asset management companies.

⁶See Box 7 for a discussion of the core principles that are critical for effective banking regulation and supervision.

⁷For more details, see Gerard Caprio, Jr., and Daniela Klingebiel, "Bank Insolvency: Bad Luck, Bad Policy, or Bad Banking?" *Annual World Bank Conference on Development Economics* (Washington: World Bank, 1996) and Gerard Caprio, Jr., "Safe and Sound Banking in Developing Countries: We're Not in Kansas Anymore," Policy Research Working Paper 1739 (Washington: World Bank, March 1997).

cases, overly expansionary monetary and fiscal policies have spurred lending booms, excessive debt accumulation, and overinvestment in real assets, which have driven up equity and real estate prices to unsustainable levels. The eventual tightening of policies to contain inflation and promote the adjustment of external positions, and the inevitable correction of

asset prices, has then led to a slowdown in economic activity, debt-servicing difficulties, declining collateral values and net worth, and rising levels of nonperforming loans that threaten banks' solvency. Macroeconomic factors, especially lending booms, have been found to play an important role in creating financial sector vulnerability in many Latin American coun-

tries¹⁰⁰ and in other emerging market economies as well.¹⁰¹ Macroeconomic instability has been an important underlying factor also in most of the banking crises experienced by industrial countries in the post-war period.

In addition to domestic macroeconomic conditions, external conditions have also played a role in financial crises, especially in emerging market economies.¹⁰² Most notable have been sudden, large shifts in the terms of trade and in world interest rates. An unanticipated drop in export prices, for instance, can impair the capacity of domestic firms to service their debts and can result in a deterioration in the quality of banks' loan portfolios. Movements in interest rates in the major industrial countries have become increasingly important to emerging market economies worldwide, reflecting the increasing integration of world capital markets and the globalization of investment.¹⁰³ Sustained declines in world interest rates have induced surges in capital flows to emerging market countries, as international investors have sought higher yields and as the creditworthiness of externally indebted countries has benefited from lower rates. An abrupt rise in industrial country interest rates, however, can curb the flow of foreign financing to emerging markets, raising the cost to domestic banks (and firms) of funding themselves offshore and increasing adverse selection and moral hazard problems and the fragility of the financial system.¹⁰⁴ Some recent empirical re-

search has found that the incidence of banking crises in emerging market economies is systemically related to changes in global financial conditions.¹⁰⁵

The composition of capital inflows has been considered an important factor in a number of currency crises in emerging market countries. In both the recent crisis in Thailand and in the 1994–95 Mexican crisis, the reliance on short-term borrowing to finance large current account deficits was a crucial ingredient precipitating the crises.¹⁰⁶ Foreign direct investment, in contrast to debt-creating inflows, is often regarded as providing a safer and more stable way to finance development because it refers to ownership and control of plant, equipment, and infrastructure and therefore funds the growth-creating capacity of an economy, whereas short-term foreign borrowing is more likely to be used to finance consumption.¹⁰⁷ Furthermore, in the event of a crisis, while investors can divest themselves of domestic securities and banks can refuse to roll over loans, owners of physical capital cannot find buyers so easily. In practice, however, questions may be raised about the reliability of data that distinguish direct investment from other capital flows, and some research has shown that net foreign direct investment flows are in fact quite volatile.¹⁰⁸

Changes in recent decades in the maturity structure and composition of portfolio investment flows, and in interest rate arrangements, have altered the vulnerability of countries to shocks. In the high-inflation environment of the 1970s, international transactions shifted toward shorter maturities and variable interest rates. Thus, the debt crisis of 1982 was worsened because much of the external debt of the Latin American countries affected by the crisis was tied to short-term rates. More recently, the syndicated bank loans of the 1980s were replaced by equity and bond investments as the preferred vehicles of international lending. This has been viewed by some as having made sudden withdrawals of capital more difficult, since during crises foreign investors may not only incur foreign exchange losses but also face falling domestic asset prices. The crises in Mexico and east Asia, however, have clearly demonstrated the dangers of high levels of short-term, foreign-currency-denominated debt, whether sovereign or private.

¹⁰⁰See Michael Gavin and Ricardo Hausmann, "The Roots of Banking Crises: The Macroeconomic Context," in Hausmann and Rojas-Suarez, *Banking Crises in Latin America*; and Jeffrey Sachs, Aaron Tornell, and Andrés Velasco "Financial Crises in Emerging Markets: The Lessons from 1995," *Brookings Papers on Economic Activity: I* (1996), pp. 147–98.

¹⁰¹See Kaminsky and Reinhart, "The Twin Crises." Eichengreen and Rose, "Staying Afloat When the Wind Shifts," however, found that, while there is some evidence that unstable domestic macroeconomic policies play a role in the onset of banking crises in emerging market countries, there is little evidence of an independent role for domestic credit booms.

¹⁰²See Annex VI, *International Capital Markets* (November 1997).

¹⁰³The sensitivity of capital flows to developing countries to changes in world interest rates has been emphasized by Guillermo A. Calvo, Leonardo Leiderman, and Carmen M. Reinhart, "Capital Inflows and Real Exchange Rate Appreciation in Latin America: The Role of External Factors," *Staff Papers*, IMF, Vol. 40 (March 1993), pp. 108–51, and "Inflows of Capital to Developing Countries in the 1990s," *Journal of Economic Perspectives*, Vol. 10 (Spring 1996), pp. 123–39; and Mark P. Taylor and Lucio Sarno, "Capital Flows to Developing Countries: Long- and Short-Term Determinants," *World Bank Economic Review*, Vol. 11 (September 1997), pp. 451–70. For a further assessment of the role played by world interest rate movements, see *International Capital Markets* (November 1997), pp. 243–45.

¹⁰⁴The links between increases in interest rates, adverse selection and moral hazard problems, and financial crises have been described in Frederic S. Mishkin, "Understanding Financial Crises: A Developing Country Perspective," NBER Working Paper 5600 (Cambridge, Massachusetts: National Bureau of Economic Research, June 1996).

¹⁰⁵See Eichengreen and Rose, "Staying Afloat When the Wind Shifts."

¹⁰⁶For additional details see Box 1, "Overconsumption Versus Overinvestment: The Crises in Mexico and Thailand Compared," in the December 1997 *World Economic Outlook: Interim Assessment*, pp. 10–11.

¹⁰⁷Even if short-term capital inflows finance investment, a liquidity crisis can occur if sovereign and corporate asset-liability management is poor.

¹⁰⁸See Michael P. Dooley, Eduardo Fernandez-Arias, and Kenneth M. Kletzer, "Recent Private Capital Flows to Developing Countries: Is the Debt Crisis History?" NBER Working Paper 4792 (Cambridge, Massachusetts: National Bureau of Economic Research, July 1994).

Another lesson of recent crises is that currency mismatches in private sector balance sheets (of either financial institutions or corporations) may be more of a problem in countries with inflexible exchange rates, since an exchange rate peg may encourage borrowers to ignore exchange rate risk. In sum, experience suggests that countries with high levels of short-term debt, variable-rate debt, foreign-currency-denominated debt, or foreign debt intermediated through domestic financial institutions are likely to be particularly vulnerable to internal or external shocks and thus susceptible to financial crises.

Financial sector distortions, in conjunction with macroeconomic volatility, form another group of factors behind many banking crises. Often these distortions arise in times of rapid financial liberalization and innovation in countries with weak supervisory and regulatory policies or where the government intervenes directly in the allocation or pricing of credit. Insufficiently stringent regulatory regimes in more liberalized financial environments have created moral hazard by encouraging financial institutions with low capital ratios to assume imprudent risks. They have also tended to increase the mistakes financial institutions make in evaluating and monitoring risks in the more competitive environments arising from deregulation or the privatization of state-owned banks.¹⁰⁹ In some cases, connected lending, politically motivated lending, and fraud further worsen the quality of asset portfolios. And deficiencies in accounting, disclosure, and legal frameworks add to the problem by allowing financial institutions to disguise the extent of their difficulties (Box 7). To all this must be added the frequent failure of governments to take prompt corrective action when problems emerge, with the consequence that losses become larger and more difficult to manage.

Currency Crises and Contagion

Macroeconomic imbalances have often been at the root of foreign exchange market crises. Experience clearly demonstrates that unsustainably large current account deficits can bring about sudden reversals in capital inflows and sharp changes in exchange rates (Box 8). Most often, crises have arisen when large external imbalances have developed in inflexible ex-

change rate systems that have allowed the currency to become significantly overvalued. A remarkable feature of recent currency crises, however, has been the extent to which instability in foreign exchange markets has been transmitted across countries. An attack on one currency has spilled over or spread contagiously to the currencies of other countries with apparently sound fundamentals.

It is useful to distinguish three sets of reasons why currency crises tend to be clustered in time.¹¹⁰ One is that crises may stem from a common cause—for instance, major economic shifts in industrial countries that trigger crises in emerging markets—in what has been referred to as “monsoonal effects.”¹¹¹ The sharp increase in U.S. interest rates in the early 1980s was an important factor in the Latin American debt crisis. Similarly, the large appreciation of the dollar, especially vis-à-vis the yen, between mid-1995 and 1997 contributed to the weakening of the external sector in several southeast Asian countries. But while external events may contribute to or precipitate a crisis, a country’s vulnerability to a crisis depends on domestic economic conditions and policies, such as overborrowing for unproductive uses, a fragile financial sector, or an inflexible exchange rate system. A second reason why crises may be clustered is that a crisis in one country may affect the macroeconomic fundamentals in another country, either because of trade and capital market linkages (for example, a devaluation in one country adversely affects the international competitiveness of other countries) or because of interdependences in creditors’ portfolios (for example, illiquidity in one market forces financial intermediaries to liquidate assets in other markets).¹¹² Such “spillovers” resulting from interdependences have been cited as contributing in important ways to the spread of the east Asian crisis. A third reason for clustering is that a crisis in one country may lead creditors to reevaluate the fundamentals of other countries, even if these have not objectively changed, or may lead creditors to reduce the riskiness of their portfolios and “flee to quality.” It is this effect, specifically, that is sometimes referred to as contagion (or “pure” contagion);¹¹³ it may be associated with “herding” by investors, resulting from bandwagon effects driven by asymmetric information or from the incentives faced by fund managers.

¹⁰⁹Despite the trend toward greater financial market openness, in many emerging market economies government involvement remains large. As a consequence, banks often make decisions that are not based on purely commercial criteria, thus increasing the riskiness of banks’ assets. Moreover, because of their limited experience under repressed or regulated financial systems of operating on a commercial basis, banks are rendered more vulnerable to the competitive pressures that emerge when the sector is deregulated.

¹¹⁰See Paul R. Masson, “Contagion: Monsoonal Effects, Spillovers, and Jumps Between Multiple Equilibria” (unpublished; Washington: IMF, 1998).

¹¹¹Paul R. Masson and Michael Mussa, “The Role of the IMF: Financing and Its Interactions with Adjustment and Surveillance,” Pamphlet Series, No. 50 (Washington: IMF, 1995).

¹¹²Ilan Goldfajn and Rodrigo O. Valdés, “Capital Flows and the Twin Crises: The Role of Liquidity,” Working Paper 97/87 (Washington: IMF, July 1997).

¹¹³This arises only if financial markets exhibit multiple equilibria and self-fulfilling speculative attacks.

Box 7. Effective Banking Prudential Regulations and Requirements

Effective prudential regulation and supervision of banks are essential to the financial stability and efficient functioning of any economy because the banking system plays a central role in the payments system and in the mobilization and distribution of saving. The task of such regulation and supervision is to ensure that banks operate in a prudent manner and that they hold capital and reserves sufficient to support the risks that arise in their business. Strong and effective banking regulations and supervision provide a public good that is needed to complement market forces for prudent banking to be ensured in any country.

Weaknesses in the banking system of a country can threaten financial stability, both in that country and internationally. Thus, ways to strengthen financial systems have attracted growing international concern. Several official bodies, including the Basle Committee on Banking Supervision,¹ the Bank for International Settlements (BIS), the IMF, and the World Bank, have recently been examining ways to do so.²

The Basle Committee on Banking Supervision has formulated 25 basic principles (The Basle Core Principles) that need to be in place for a supervisory system to be effective. These principles can be summarized as follows.³

Preconditions for Effective Banking Supervision

1. To be effective, a system of banking supervision should have clear responsibilities and objectives for each agency involved in the supervision of banking organizations. Each such agency should possess operational independence and adequate resources. A suitable legal framework for banking supervision is also necessary, including provisions relating to authorization of banking

¹The Basle Committee on Banking Supervision was established by the central bank Governors of the Group of Ten countries in 1975 and consists of senior representatives of banking supervisory authorities and central banks from Belgium, Canada, France, Germany, Italy, Japan, Luxembourg, the Netherlands, Sweden, Switzerland, the United Kingdom, and the United States.

²For details see David Folkerts-Landau and Carl-Johan Lindgren, *Toward a Framework for Financial Stability* (Washington: IMF, January 1998).

³A comprehensive summary of these principles is provided in Folkerts-Landau and Lindgren, *Toward a Framework for Financial Stability*. See also Basle Committee on Banking Supervision, *Core Principles for Effective Banking Supervision* (Basle, Switzerland: Bank for International Settlements, 1996).

organizations and their ongoing supervision; powers to address compliance with laws as well as safety and soundness concerns; and legal protection for supervisors. Arrangements for sharing information among supervisors, and protecting its confidentiality, should also be in place.

Licensing and Structure

2. The permissible activities of institutions that are licensed and subject to supervision as banks should be clearly defined, and the use of the word “bank” in names must be controlled as far as possible.

3. The licensing authority must have the right to set criteria and reject applications for establishments that do not meet the standards set. The licensing process, at a minimum, should consist of an assessment of the banking organization’s ownership structure, directors, and senior management; its operating plan and internal controls; and its projected financial condition, including its capital base. Where the proposed owner or parent organization is a foreign bank, the prior consent of its home country supervisor should be obtained.

4. Banking supervisors must have the authority to review and reject any proposals to transfer significant ownership or controlling interests in existing banks to other parties.

5. Banking supervisors must have the authority to establish criteria for reviewing major acquisitions or investments by a bank and to ensure that corporate affiliations or structures do not expose the bank to undue risks or hinder effective supervision.

Prudential Regulations and Requirements

6. Banking supervisors must set prudent and appropriate minimum capital adequacy requirements for all banks. Such requirements should reflect the risks that the banks undertake and must define the components of capital, bearing in mind their ability to absorb losses. At least for internationally active banks, these requirements should not be less than those established in the Basle Capital Accord and its amendments.

7. An essential part of any supervisory system is the evaluation of a bank’s policies, practices, and procedures related to the granting of loans and making of investments and the ongoing management of the loan and investment portfolios.

8. Banking supervisors must be satisfied that banks establish and adhere to adequate policies, practices, and procedures for evaluating the quality of assets and the adequacy of loan-loss provisions and loan-loss reserves.

The scope for speculative pressures to spread across countries has been of increased concern to policymakers since the 1992–93 ERM crises and especially since the 1994–95 Mexican crisis and the recent east Asian crisis. During the ERM crises, the French franc, the

Irish pound, and the Swedish krona experienced speculative pressures when the Italian lira, the pound sterling, and the Finnish markka were floated. Similar pressures were experienced by Norway when the Swedish krona’s peg to the European currency unit

9. Banking supervisors must be satisfied that banks have management information systems that enable management to identify concentrations within the portfolio, and supervisors must set prudential limits to restrict bank exposures to single borrowers or groups of related borrowers.

10. To prevent abuses arising from connected lending, banking supervisors must have in place requirements that banks lend to related companies and individuals on an arm's-length basis, that such extensions of credit are effectively monitored, and that other appropriate steps are taken to control or mitigate the risks.

11. Banking supervisors must be satisfied that banks have adequate policies and procedures for identifying, monitoring, and controlling country risk and transfer risk in their international lending and investment activities, and for maintaining appropriate reserves against such risks.

12. Banking supervisors must be satisfied that banks have in place systems that accurately measure, monitor, and adequately control market risks; supervisors should have powers to impose specific limits or a specific capital charge (or both) on market risk exposures, if warranted.

13. Banking supervisors must be satisfied that banks have in place a comprehensive risk management process (including appropriate board and senior management oversight) to identify, measure, monitor, and control all other material risks and, where appropriate, to hold capital against these risks.

14. Banking supervisors must determine that banks have in place internal controls that are adequate for the nature and scale of their business. These should include clear arrangements for delegating authority and responsibility; separation of the functions that involve committing the bank, paying away its funds, and accounting for its assets and liabilities; reconciliation of these processes; safeguarding its assets; and appropriate independent internal or external audit and compliance functions to test adherence to these controls as well as applicable laws and regulations.

15. Banking supervisors must determine that banks have adequate policies, practices, and procedures in place, including strict "know-your-customer" rules, that promote high ethical and professional standards in the financial sector and prevent the bank being used, intentionally or unintentionally, by criminal elements.

Methods of Ongoing Banking Supervision

16. An effective banking supervisory system should consist of some form of both on-site and off-site supervision.

17. Banking supervisors must have regular contact with bank management and thorough understanding of the institution's operations.

18. Banking supervisors must have a means of collecting, reviewing, and analyzing prudential reports and statistical returns from banks on a solo and consolidated basis.

19. Banking supervisors must have a means of independent validation of supervisory information either through on-site examinations or use of external auditors.

20. An essential element of banking supervision is the ability of the supervisors to supervise the banking group on a consolidated basis.

Information Requirements

21. Banking supervisors must be satisfied that each bank maintains adequate records drawn up in accordance with consistent accounting policies and practices that enable the supervisor to obtain a true and fair view of the financial condition of the bank and the profitability of its business, and that the bank publishes on a regular basis financial statements that fairly reflect its condition.

Formal Powers of Supervisors

22. Banking supervisors must have at their disposal adequate supervisory measures to bring about timely corrective action when banks fail to meet prudential requirements (such as minimum capital adequacy ratios), when there are regulatory violations, or where depositors are threatened in any other way. In extreme circumstances, this should include the ability to revoke the banking license or recommend its revocation.

Cross-Border Banking

23. Banking supervisors must practice global consolidated supervision over their internationally active banking organizations, adequately monitoring and applying appropriate prudential norms to all aspects of the business conducted by these banking organizations worldwide, primarily at their foreign branches, joint ventures, and subsidiaries.

24. A key component of consolidated supervision is establishing contact and information exchange with the various other supervisors involved, primarily host-country supervisory authorities.

25. Banking supervisors must require the local operations of foreign banks to be conducted to the same high standards as are required of domestic institutions and must have powers to share information needed by the home-country supervisors of those banks for the purpose of carrying out consolidated supervision.

(ECU) was abandoned, and by the Portuguese escudo when the Spanish peseta was devalued. The depreciation of the Mexican peso in December 1994 led to speculative pressures on other emerging market currencies, especially those of Argentina and Brazil, and

to a lesser extent the Philippines. Finally, the crisis in Thailand in mid-1997 quickly spread with great force and persistence to Indonesia, Malaysia, the Philippines, and, somewhat later, to Korea and, more briefly, to Hong Kong SAR, Singapore, and Taiwan Province of

Box 8. The Current Account and External Sustainability

In evaluating the macroeconomic and external implications of persistent current account deficits, three questions are often posed. Is the debtor country *solvent*? Are current account imbalances *sustainable*? Is the current account deficit *excessive*? This box discusses the notion of current account sustainability, its relation to solvency, and the two main approaches that have been used to make this notion operational.¹ The question of whether the current account deficit is “excessive” is not discussed in detail.²

A first approach to current account sustainability relies on projecting into the future the current policy stance or private sector behavior; sustainability is ensured if the resulting path of the trade balance is consistent with intertemporal solvency. If an unchanged policy stance is eventually going to lead to a “drastic” shift to reverse the trade balance position (such as a sudden policy tightening, causing a large recession) or lead to a balance of payments crisis (such as an exchange rate collapse that raises the probability of default on external obligations), the current account position is assumed to be unsustainable. The drastic change in policy or crisis situation can be triggered by a domestic or an external shock that causes a shift in domestic and foreign investors’ confidence and a reversal of international capi-

tal flows.³ A second approach to external sustainability, which is linked to the extensive literature on balance of payments and currency crises, relies instead on a composite set of macroeconomic, financial, and external indicators to evaluate the risk of external crises.⁴

Until recently, analyses of external sustainability based on the first approach relied on the standard condition relating the dynamics of debt accumulation to the trade balance, the economy’s growth rate, the real interest rate on the debt, and the real exchange rate. Given the change in the composition of capital flows during the 1990s, however, this approach provides only a partial picture of the dynamics of external liabilities because it ignores the evolution of the net equity position of the country and its impact on future investment income outflows. It is therefore necessary to extend the approach so as to account for the impact of non-debt-creating flows, such as foreign direct investment and portfolio equity investment, on a country’s stock of external liabilities. This raises important measurement problems, as well as interesting questions regarding risk sharing between the domestic economy and foreign investors.

Clearly, for an economy to remain solvent, the ratio of external liabilities to output or to exports cannot grow without bound. Therefore, the long-run net resource trans-

¹For further discussion, see Gian Maria Milesi-Ferretti and Assaf Razin, *Current Account Sustainability*, Princeton Studies in International Finance, No. 81 (Princeton, New Jersey: Princeton University, October 1996).

²To answer this question, a benchmark is needed that gives information on the “appropriate” level of current account imbalances. This benchmark can be based on a model that specifies the behavior of consumption, investment, and output, with public and private sectors obeying their intertemporal budget constraints. Actual imbalances can then be compared with the predicted ones to judge whether they have been excessive. Intertemporal models of current account determination using data from industrial and developing countries have been estimated by, among others, Atish Ghosh and Jonathan Ostry, “The Current Account in Developing Countries: A Perspective from the Consumption-Smoothing Approach,” *World Bank Economic Review*, Vol. 9 (No. 2, May 1995), pp. 305–33; Leonardo Leiderman and Assaf Razin, “Determinants of External Imbalances: The Role of Taxes, Government Spending, and Productivity,” *Journal of the Japanese and International Economies*, Vol. 5 (December 1991), pp. 421–50; and Reuven Glick and Kenneth S. Rogoff, “Global Versus Country-Specific Productivity Shocks and the Current Account,” *Journal of Monetary Economics*, Vol. 35 (February 1995), pp. 159–92.

³For an analysis of sharp reductions in current account deficits and their consequences for economic activity, see Gian Maria Milesi-Ferretti and Assaf Razin, “Sharp Reductions in Current Account Deficits: An Empirical Analysis,” Working Paper 97/168 (Washington: IMF, December 1997); and Gian Maria Milesi-Ferretti and Assaf Razin, “Current Account Reversals and Currency Crises,” paper presented at the NBER conference on Currency Crises, Cambridge, Massachusetts, February 6–7, 1998.

⁴See, for example, Rudiger Dornbusch, Ilan Goldfajn, and Rodrigo Valdes, “Currency Crises and Collapses,” *Brookings Papers on Economic Activity*: 2 (1995), pp. 219–93; Morris Goldstein, “Presumptive Indicators/Early Warning Signals of Vulnerability to Financial Crises in Emerging Market Economies” (unpublished; Washington: Institute for International Economics, January 1996); Graciela Kaminsky, Saul Lizondo, and Carmen M. Reinhart, “Leading Indicators of Currency Crises,” Working Paper 97/79 (Washington: IMF, July 1997); Gian Maria Milesi-Ferretti and Assaf Razin, “Current Account Sustainability: Selected East Asian and Latin American Experiences,” Working Paper 96/110 (Washington: IMF, October 1996); and Jeffrey Sachs, Aaron Tornell, and Andrés Velasco, “Financial Crises in Emerging Markets: Lessons from 1995,” *Brookings Papers on Economic Activity*: 1 (1996), pp. 147–98.

China within the region, as well as to a number of emerging market economies in other regions.

Empirical evidence on the ERM crises suggests that spillover and contagion effects did play a role. Countries that came under speculative attack had quite different macroeconomic fundamentals, and only in some cases could the attacks be explained by weaknesses in this area. Rather, the beliefs of investors

about the incentives facing monetary authorities to ease policy so as to promote economic recovery seem to have played an important role.¹¹⁴

¹¹⁴See Barry Eichengreen, Andrew K. Rose, and Charles Wyplosz, “Speculative Attacks on Pegged Exchange Rates: An Empirical Explanation with Special Reference to the European

fer (trade surplus) that an indebted country must undertake in order to keep the ratio of external liabilities to GDP constant has often been used as a simple measure of solvency. This measure, however, has serious shortcomings. First, although it provides a long-run condition for the stability of the ratio of external liabilities to GDP, there can be no presumption of whether that ratio is “optimal” or appropriate. Second, in developing countries, protracted current account imbalances can characterize these countries’ transition toward higher levels of output, implying that steady-state conditions may not be the appropriate benchmark to evaluate the sustainability of current account imbalances. In other words, there can be no presumption that in the short and medium run a fast-growing economy with a low level of external liabilities should aim at stabilizing the ratio of external liabilities to GDP or to exports at its current level. Third, this calculation is based on the presumption that the country will not face future “liquidity constraints” because foreign investors would be willing to continue lending on current terms. In a world of high capital mobility and rapid response of capital flows to “news,” this assumption may be inappropriate. For example, these simple solvency tests would clearly have failed to signal problems ahead for most fast-growing Asian economies, including Indonesia and Korea.

For these reasons, some authors are strongly critical of sustainability analyses that focus exclusively on solvency conditions and flow variables, such as the current account, and argue that external crises can occur because of stock imbalances and capital market factors, and not just because of the current account position.⁵ This suggests the need to monitor a more comprehensive set of capital account and financial indicators, in addition to the current account, so as to correctly evaluate external sustainability. The approach based on indicators can be complementary to the study of the dynamics of external liabilities; a more general set of macroeconomic, financial, and external variables can provide useful information on a country’s vulnerability to external shocks and changes in foreign investors’ sentiment.

⁵See, for instance, Guillermo A. Calvo, “Varieties of Capital Market Crises,” in G. A. Calvo and Mervyn King, eds., *The Debt Burden and Its Consequences for Monetary Policy* (New York: St. Martin’s, 1997); and Guillermo A. Calvo, “Balance of Payments Crises in Emerging Markets,” paper presented at the NBER conference on Currency Crises, Cambridge, Massachusetts, February 6–7, 1998.

A number of indicators have been proposed in the literature. The importance of some of these indicators (such as economic growth, the rate of investment, export performance, openness to trade) can be directly related to the ability of a country to generate future trade surpluses so as to repay external liabilities. The rate of growth in private credit, stock market performance, and, especially, indicators of the health of the banking system (such as the level of nonperforming loans and the quality of prudential supervision) can be useful in gauging whether private sector behavior is inconsistent with its intertemporal budget constraint because of, say, actual, implicit, or perceived bailout guarantees, or asset price bubbles.⁶ They can also shed light on whether the domestic financial market is acting as an efficient allocation mechanism, channeling available foreign saving to productive uses. Other indicators, such as the volatility of the terms of trade, can provide a measure of the vulnerability of a country to external shocks. The composition of external liabilities, the ratio of M2 to reserves, and the size of short-term external debt liabilities relative to short-term external assets (net foreign exchange reserves) can be useful indicators of a country’s vulnerability to sudden swings in investor sentiment. The experience of Mexico, and more recently that of Thailand and Korea, testifies to the importance of these elements. The level of the real exchange rate can be another important indicator of sustainability, although it is more complex to interpret: a real appreciation could be driven by supply-side effects, such as fast productivity growth in the traded-goods’ sector, but it could also be an indicator of misalignment if it reflects, for example, the effects of an unsustainable consumption boom on the price of nontraded goods.⁷

The main hurdle faced by analyses of sustainability based on indicators is how to “rank” these different indicators and how to translate them into an overall measure of external sustainability or vulnerability to external shocks. Research in this area is under way, as described in this chapter.

⁶See Asli Demirgüç-Kunt and Enrica Detragiache, “The Determinants of Banking Crises: Evidence from Developed and Developing Countries,” Working Paper 97/106 (Washington: IMF, September 1997), for a cross-country study of banking crises.

⁷The difficulty in determining the degree of misalignment in real exchange rates is that estimates of equilibrium real exchange rates are inherently imprecise (see Box 5).

Spillover and contagion effects also appear to have played a role in the 1994–95 Mexican crisis. Evidence of increased cross-country correlation in movements

Monetary System,” in Matthew Canzoneri, Wilfred Ethier, and Vittorio Grilli, eds., *The New Transatlantic Economy* (New York and Cambridge: Cambridge University Press, 1996). See also the January 1993 *World Economic Outlook: Interim Assessment*.

of equity and Brady bond returns among emerging markets in Latin America in the wake of the crisis, together with the heterogeneity of macroeconomic fundamentals, has been interpreted as indicating either herding behavior by investors or the effect of investors selling off equities in several emerging markets in order to raise cash to meet expected increases in redemptions in other markets (that is, interdepen-

dence in creditors' portfolios).¹¹⁵ Some observers have argued that it is difficult to find fundamentals that could account for this "tequila effect"; rather, the tequila effect is seen as a reflection of investor pessimism. Events in Mexico, it is suggested, caused investors to believe that other emerging market economies might experience similar difficulties and provoked a downturn in capital flows and a run on other currencies, even though fundamentals were essentially unchanged.¹¹⁶ Others have argued, however, that the shift in expectations generated by the Mexican crisis affected only countries with weak fundamentals. These countries were vulnerable to self-fulfilling investor pessimism, or contagion, whereas countries with strong fundamentals experienced only very short-lived downturns in capital inflows.¹¹⁷

The evolution of the east Asian crises suggests that spillover and contagion effects also played a role, perhaps to an even greater extent than in the tequila crisis. Formal empirical evidence is not yet available, however.¹¹⁸ But empirical evidence on contagion can never be definitive because it is impossible to be certain that the estimated model incorporates the true fundamentals, or does so correctly. For instance, it may be particularly difficult to model banking sector weaknesses properly. Systematic empirical analysis of contagious financial crises is in its infancy, especially for emerging markets. Results for industrial countries, however, provide support for the hypothesis that speculative attacks in foreign exchange markets spread across countries. Specifically, the likelihood of a currency crisis in a given country has been found to increase with the occurrence of a crisis elsewhere. Furthermore, it appears that trade links are better at explaining the international transmission of currency crises than similarities in the macroeconomic characteristics of the economies concerned.¹¹⁹

Indicators of Vulnerability

In view of the costly adjustment that economies undergo in the wake of financial crises, there has been

considerable interest in identifying configurations of economic variables that can serve as early warning signals of crises.¹²⁰ Attempts to do so, however, have met with only limited success. While many of the proposed early warning systems have been able to predict particular crises, few have displayed the ability to do so consistently.

In fact, it is highly unlikely that a set of indicators could be identified that could detect future crises sufficiently early and with a high degree of certainty, while not giving false signals. Indeed, if such indicators could be identified they would likely lose their usefulness because they would change behavior: markets would take them into account and, by anticipating crises, precipitate them earlier, or policymakers would take actions to prevent crises from occurring. Consequently, the indicators would lose their ability to predict crises. But even though the search for reliable crisis predictors would seem a hopeless task, it nevertheless seems useful to investigate whether there are variables that have systematically been associated with vulnerability to crises. Such indicators of vulnerability could be used to identify situations in which an economy faces the risk of a financial crisis being triggered by changes in world economic conditions, spillovers from crises in other countries, or other forces that are liable to cause a sudden shift in market sentiment if imbalances go unaddressed.

A commonly used approach to constructing an "early warning system," which is followed below, is to identify a set of variables whose behavior prior to episodes of financial market pressures or crises is systematically different from that during normal, or tranquil, periods.¹²¹ By closely monitoring these variables, it may be possible to detect behavior patterns similar to those that in the past have preceded crises. The difficulty lies in identifying the relevant variables to monitor: variables that not only warn of an impending crisis with a high degree of success, but that also do not produce frequent false signals, so that they can be used with some degree of confidence.

There are potentially a large number of variables that might serve as indicators of vulnerability. The choice is determined largely by one's understanding of the causes and proximate determinants of crises. For example, if it is considered that currency crises are caused mainly by fiscal problems, then variables such as the fiscal deficit, government consumption, and credit to the public sector by the banking system tend to feature prominently in the set of indica-

¹¹⁵See Sara Calvo and Carmen M. Reinhart, "Capital Flows to Latin America: Is There Evidence of Contagion Effects?" Policy Research Working Paper 1619 (Washington: World Bank, June 1996).

¹¹⁶See Guillermo A. Calvo, "Capital Flows and Macroeconomic Management: Tequila Lessons," *International Journal of Finance and Economics*, Vol. 1 (July 1996), pp. 207–23.

¹¹⁷See Sachs, Tornell, and Velasco, "Financial Crises in Emerging Markets."

¹¹⁸Calculations using a balance of payments model in which multiple equilibria are possible suggest that there may have been contagion effects during the east Asian crises. These calculations, however, are not statistical tests of contagion. See Masson, "Contagion: Monsoonal Effects."

¹¹⁹See Eichengreen, Rose, and Wyplosz, "Contagious Currency Crises."

¹²⁰See, for example, Morris Goldstein, "Presumptive Indicators/Early Warning Signals of Vulnerability to Financial Crises in Emerging Market Economies" (unpublished; Washington: Institute for International Economics, January 1996).

¹²¹For example, see Frankel and Rose, "Currency Crashes in Emerging Markets"; Eichengreen and Rose, "Staying Afloat When the Wind Shifts"; and Kaminsky and Reinhart, "The Twin Crises."

tors.¹²² If weaknesses in the financial sector are perceived to lie at the root of currency crises, then variables such as private sector credit growth, measures of financial liberalization, the level of short-term foreign indebtedness of the banking system, the structure of domestic interest rates, changes in equity prices, the quality of bank assets measured by the extent of nonperforming loans, and so forth, could be used as indicators.¹²³ Similarly, if external sector problems are viewed as being largely responsible for currency crises, then the real exchange rate, the current account balance, changes in the terms of trade, the differential between foreign and domestic interest rates, changes in the level and maturity structure of foreign capital inflows, and other such variables may be used.¹²⁴ Real sector variables such as the rate of growth of output, the unemployment rate, variables to proxy institutional and structural factors, and political developments have also been employed.¹²⁵

Unlike currency crises, where sharp changes in high-frequency variables such as international reserves, interest rates, and the exchange rate itself make the dating of crises relatively straightforward, the lack of high-frequency data that could be used to consistently mark the onset of banking difficulties makes the construction of leading indicators of banking crises more difficult. The dating of banking crises is much more approximate than that of currency crises because it depends on the occurrence of “events” such as the closure or government takeover of financial institutions, bank runs, and the like. There is therefore a greater risk of dating crises either “too late”—since financial problems usually begin well before bank closures or bank runs occur—or “too early,” since the peak of a crisis is generally reached much later. Nevertheless, even with approximate dates for the onset of banking crises, an analysis of the behavior of pertinent variables around the time of crises may be useful in constructing an early warning system of vulnerability indicators.

In studies of banking crises, the choice of indicators, which may have been influenced by the way in which such crises have been measured, has been based largely on the premise that weaknesses in this sector are more likely to emerge when a long period of sustained high

expectations about economic prospects, which drives up loan demand and substantially raises leverage ratios, is followed by the arrival of unexpected “bad news” that adversely affects the net worth of banks. Such “bad news” could be developments that either raise sharply the credit risk of a significant fraction of borrowers, such as steep declines in export prices or property prices, or increase the cost of funding their loans, such as higher domestic or foreign interest rates or a depreciation of the exchange rate. Moreover, the health of the banking system itself is an important determinant of vulnerability of the economy to crises.

The reverse, however, is also true. By its nature, banking business is conducted on the basis of expectations about the future state of the economy. When an economy undergoes a downturn that was not anticipated, investments may turn sour, which in turn may adversely affect the quality of banks’ loan portfolios. For the fast-growing developing countries, especially the recipients of large capital inflows, the failure of prudential regulations to keep pace with advances in financial liberalization has often resulted in banking sectors becoming increasingly vulnerable to sudden reversals in investor sentiment. Consequently, macroeconomic variables reflecting factors that affect the economic prospects of borrowers and thus their capacity to service their loans—such as output growth, equity prices, inflation, real interest rates, the real exchange rate, the terms of trade, and capital inflows—and variables that may provide an indication of the health of the banking industry—such as the growth in domestic credit, the loan-to-deposit ratio, changes in the money multiplier, and other measures of the degree of financial liberalization—have been used as to identify vulnerabilities in the banking sector.¹²⁶

Finally, since the causes of banking crises are often similar to those of currency crises—in particular, loose monetary conditions, overheating of the economy, and the bursting of asset price bubbles—many of the indicators are also similar.

Stylized Behavior of Macroeconomic Variables Before and After Crises

The approach described above was used to analyze the behavior of a number of macroeconomic variables around the time of *currency crises* during the period 1975–97, for the group of 50 advanced and emerging market countries noted earlier. The behavior of the real exchange rate, some monetary and financial market aggregates, and some trade-related variables was

¹²²See, for example, Sebastian Edwards, *Real Exchange Rates, Devaluation, and Adjustment: Exchange Rate Policy in Developing Countries* (Cambridge, Massachusetts: MIT Press, 1989).

¹²³Kaminsky and Reinhart, “The Twin Crises,” discuss the indicative properties of a broad set of financial variables.

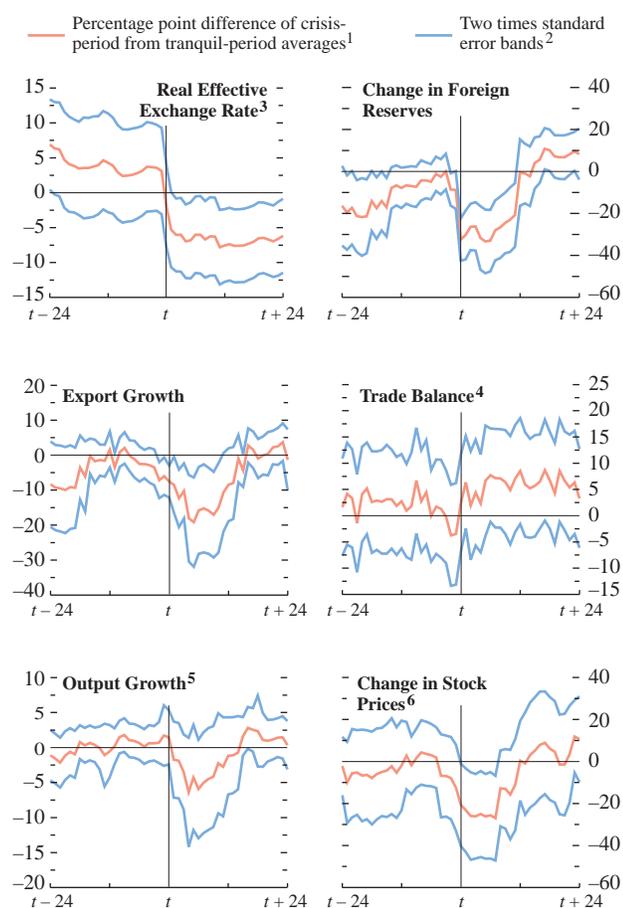
¹²⁴For example, see Steven B. Kamin, “Devaluation, External Balance, and Macroeconomic Performance: A Look at the Numbers,” *Princeton Studies in International Finance*, No. 62, (Princeton, New Jersey: Princeton University, August 1988).

¹²⁵For a summary of various indicators employed in the literature, see Graciela Kaminsky, Saul Lizondo, and Carmen M. Reinhart, “Leading Indicators of Currency Crises,” Working Paper 97/79 (Washington: IMF, July 1997).

¹²⁶Demirgüç-Kunt and Detragiache, “The Determinants of Banking Crises,” provide empirical evidence on the relevance of such variables in both determining and providing early warnings of banking problems.

Figure 26. Macroeconomic Characteristics of Currency Crises

Typically, in the lead-up to a currency crisis the economy is overheated.



found to be discernibly different in the months leading to a crisis from behavior during tranquil periods.¹²⁷ These differences in average behavior, to be described below, do not imply any causal link between the variables and the occurrence of crises, however; in particular instances, the behavior of the variables referred to differed significantly from the average pattern. Moreover, these average differences reflect the sample of countries and the criterion used to identify episodes of exchange rate pressures.

In the run-up to a crisis, the real value of the domestic currency was, on average, significantly higher than its mean during tranquil periods. Around 24 months before the outbreak of a crisis (Figure 26), the real exchange rate was, on average, about 7 percent higher than its normal level. But around three months before a crisis, the real exchange rate began to decline toward the tranquil period mean, as downward pressures on the nominal exchange rate intensified. For some countries, however, there was no discernible overvaluation in the run-up to the crisis. The relative overvaluation of the domestic currency continued to narrow after the crisis date, declining to about 7 percent on average below the tranquil period average in the second year after a crisis. It could be argued that it is not altogether surprising that the real exchange rate tended to be appreciated relative to its norm prior to a crisis, since most currency crises involve significant nominal depreciations. Consequently, the appreciation to some extent reflects the way in which crises were defined and identified.

The robustness of the behavior of the real exchange rate was analyzed by dividing the sample into various subsamples: crises in industrial countries, crises in emerging market countries, crises characterized mainly by currency “crashes,” crises characterized mainly by reserve losses, “severe” crises, and crises associated with serious banking sector problems. Except for crises characterized mainly by reserve losses and those associated with banking sector problems, the average pattern of real exchange rate behavior was similar. In the case of reserve-loss crises, there was no significant difference in the dynamics of the real exchange rate over the four years centered on the crisis; on average, it remained overvalued relative to the tranquil norm throughout the period. For currency crises accompanied by banking sector problems, there was no discernible sign of overvaluation before the crises.¹²⁸

¹²⁷Real sector variables such as changes in industrial output and the ratio of broad money to narrow money, which has been used as a measure of financial liberalization, did not show any distinctive pattern in their precrisis behavior.

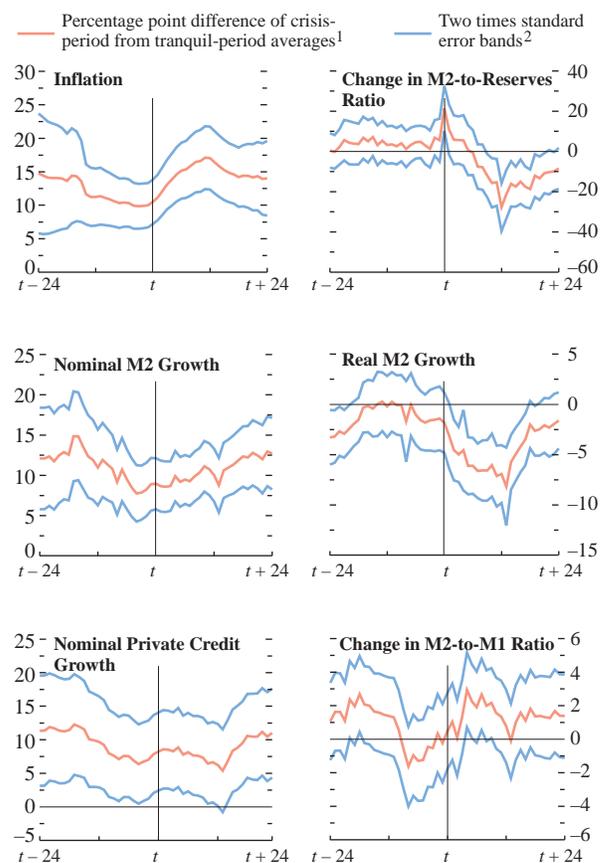
¹²⁸Differences in the behavior of macroeconomic variables during crisis periods in various types of crises are described in Jahangir Aziz, Francesco Caramazza, and Ranil Salgado, “Currency Crises: In Search of Common Features,” Working Paper (Washington: IMF, 1998, forthcoming).

The real appreciation of the domestic currency in the precrisis period was accompanied by a deterioration in export performance. But following the reversal of the appreciation during and after the crisis, exports rose significantly. Imports, by contrast, showed no discernible difference in behavior in the buildup to a crisis from that during tranquil periods, but following a crisis they contracted sharply. Similarly, the trade balance did not display any significant differences in the precrisis period except for a deterioration near the outbreak of the crisis. International reserves, measured in months of imports, also failed to display any pronounced pattern, although in absolute dollar value they declined precipitously as the crisis broke. Although, on average, some deterioration in the terms of trade occurred immediately before a crisis, especially in emerging market countries, there was no discernible change in the earlier months. Consequently, deteriorations in the terms of trade may simply have been a trigger for vulnerable situations to turn into full-fledged crises.

Inflation in the two-year period around a crisis was significantly higher than in tranquil periods. But from around 15 months prior to a crisis, the rate of inflation moderated somewhat, possibly as a result of attempts by authorities to curb the overvaluation of the real exchange rate and damp overheating pressures. With the onset of a crisis, the rate of inflation surged over the next 12 to 18 months, as the exchange rate depreciation began to be reflected in domestic prices. Following that initial spurt, however, inflation began to slow around 18 months after the crisis date. Higher-than-normal inflation preceding a crisis is one of the few characteristics that was present in all the various subgroups of crises.

Many crises have been associated with a reversal of capital inflows, with gross inflows drying up. Furthermore, in some cases holders of liquid domestic bank liabilities try to convert them into foreign exchange. Thus, the banking system's ability to withstand pressures on the currency depends, in part, on the extent to which its domestic liabilities are backed by foreign reserves—approximated, for instance, inversely by the ratio of broad money to official international reserves. This ratio showed a remarkable pattern around the time of a crisis. Starting at almost the same level as its tranquil period average, it rose throughout the 24-month period prior to a crisis, with the growth in the ratio increasing close to the crisis. (As with the appreciation of the real exchange rate, however, in some crises the ratio did not rise above its normal period average.) A few months after the crisis, the ratio plummets sharply, and two years later it is below its tranquil-period average. Behavior of this kind was more dramatic in the more severe crises and in those characterized by large devaluations. In currency crises associated with banking sector problems, the ratio did not rise appreciably before the crises. Since this vari-

Figure 26 (concluded)



¹Each panel portrays the behavior of a variable, relative to its tranquil-period mean and averaged across all crises, during a window centered around the crises (red lines). The sample period for the data was January 1975 to November 1997. For each crisis, a window of 49 months was constructed, including the 24 months before the crisis ($t - 24$), the month of the crisis (t), and 24 months after the crisis ($t + 24$). Averages were then computed across all of the crises for each month in the window. Months outside the 49-month crisis window were designated the tranquil period, and an average was computed for the entire tranquil period. Each panel represents the difference between the average value of a variable during each month of the 49-month window less the average value for the entire tranquil period.

²Standard error bands were calculated using both standard errors for crisis window and tranquil-period means.

³The real effective exchange rate was detrended by its country mean. The overvaluation preceding the crisis increases if the variable is not detrended.

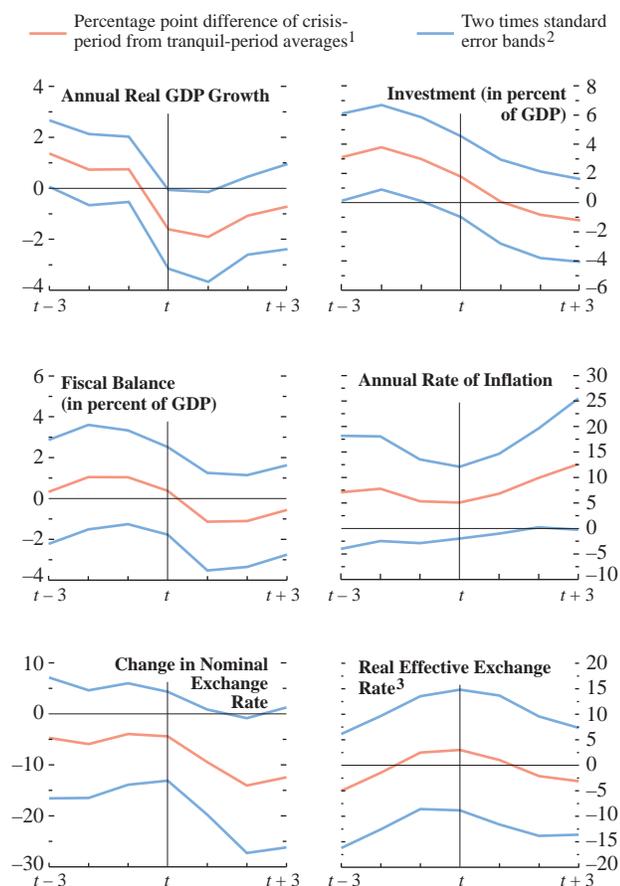
⁴Owing to the lack of monthly data for GDP, trade balances are expressed as net exports as a percent of imports.

⁵Output growth is proxied by growth in industrial output or growth in manufacturing output when industrial output is unavailable.

⁶Measured in terms of reference country currency (U.S. dollar or deutsche mark).

Figure 27. Macroeconomic Characteristics of Banking Crises

Usually, in the lead-up to a banking crisis, as for a currency crisis, the economy is overheated.



able in part captures the economy's ability to withstand speculative pressures without a sharp correction in the exchange rate, it can be viewed as an indicator of investors' confidence in the domestic financial system.

Monetary expansion—narrow and broad money growth—also tended to show a pronounced increase almost two years prior to a currency crisis, peaking around 18 months before the outbreak. From its peak, the rate of monetary expansion declines quite steadily until the crisis date for broad money, and until around nine months after the outbreak for narrow money. Subsequently, the rate of monetary expansion picks up again. The growth of credit aggregates showed similar movements. The above-normal growth rates of the monetary aggregates in the run-up to crises was robust across the various subgroups of countries and types of crises.

Currency crises have often been preceded by a boom-bust cycle in asset prices. For instance, in almost all of the countries affected by the recent Asian crisis, real estate and equity prices rose steeply during the early 1990s and then declined sharply from around mid-1996. Consistent with this experience the growth rate of equity prices in previous crises typically began to decline sharply around 6 to 12 months before a crisis, turned negative at around the sixth month, and then plummeted to around 25 percentage points below the tranquil-period average soon after the crisis. In many instances, however, this behavior of asset prices is not typical. For example, in crises where the recovery period was relatively short, asset prices remained somewhat above the tranquil period average. Similarly, in crises characterized by large losses of reserves rather than steep depreciations, asset prices did not decline. The recovery in equity prices typically began a year or so after a crisis had peaked.

Finally, although real activity, as measured by the 12-month change in industrial production, did not show any distinctive pattern ahead of a crisis, in the aftermath of a crisis it generally fell sharply, on average. However, it usually began to recover within a year, and 18 months after the outbreak of a crisis it was above its tranquil-period level.

Some previous studies have found fiscal and external current account balances to have played significant roles in currency crises. Since monthly data are not available for these variables, annual data were used. It was found that, although in the year prior to a crisis the fiscal deficit in percent of GDP increases, it is not significantly different from that during tranquil periods. However, the current account deficit in percent of GDP is significantly larger than during tranquil periods. These results tentatively suggest that, while unsustainable current account deficits tended to be part of the general overheating of the economy prior to a crisis, large fiscal deficits played a less regular role.

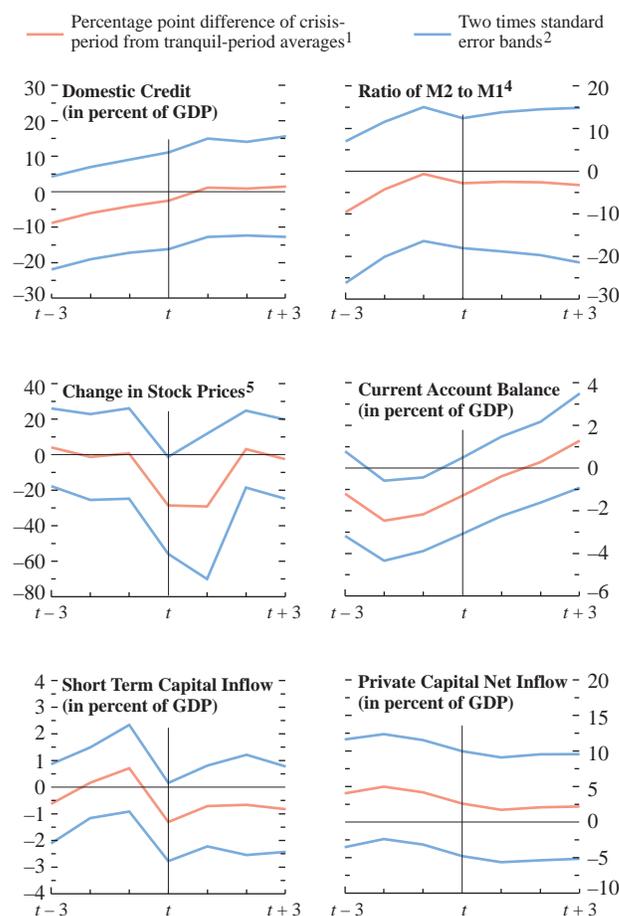
The behavior of the various indicators analyzed suggests that, typically, prior to a currency crisis the econ-

omy is overheated: inflation is relatively high, and the domestic currency is overvalued, which adversely affects the export sector. Monetary policy is significantly expansionary, with domestic credit growing strongly, compromising the exchange rate objective for countries with fixed or inflexible exchange rate systems. The financial vulnerability of the economy is increasing, with rising liabilities of the banking system unbacked by foreign reserves and falling asset prices. These observations are, of course, specific to the technique used to identify crisis episodes and to the sample of countries. Moreover, the behavior of variables in particular crises has on many occasions differed from this average pattern—for example, in a number of the Asian countries affected by the recent crisis, inflation was relatively low.

An analysis similar to the one carried out for currency crises suggests that prior to *banking crises* domestic credit grows rapidly and that pressures on the banking system are often preceded by financial liberalization (as indicated by a rising ratio of broad money to narrow money).¹²⁹ The liberalization of financial markets may also be reflected in growing deposits and high real interest rates, which tend to peak around the crisis point. High real interest rates, however, could also reflect unsuccessful attempts by the monetary authorities to tighten credit and induce a soft landing. In several cases, banking crises have also been preceded by larger inflows of short-term capital. Starting at around a year before a crisis, stock markets begin to decline; real activity also displays a downward trend (Figure 27). By the time the crisis is under way, output growth is significantly slower than its average during tranquil periods, and stock prices have fallen sharply.¹³⁰ In many countries, the collapse of the stock market has often been accompanied by similarly sharp corrections in other asset markets, notably the real estate sector.

The average pattern of economic and financial variables described above points to a possible interpretation of conditions that typically lead up to a banking crisis. The stage tends to be set by a protracted period of overheating, high inflation, and large current account deficits, along with strong credit growth, associated in part with larger short-term capital inflows than normal and reflecting in some cases recently liberalized financial systems. Then a shock, such as a drop in real activity, a slowdown in capital inflows, a deterioration in the terms of trade,¹³¹ a sharp decline in asset

Figure 27 (concluded)



¹²⁹Each panel portrays the behavior of a variable, relative to its tranquil-period mean and averaged across all crises, during a period centered around the crises (red lines). The sample period for the data was 1975 to 1997. For each crisis, a window of seven years was constructed, including the three years before the crisis ($t - 3$), the year of the crisis (t), and three years after the crisis ($t + 3$). Years outside this seven-year crisis window were designated the tranquil period, and an average was computed for the entire tranquil period. Averages were then computed across all of the crises for each year in a seven-year period around the crisis. Each panel represents the difference between the average value of a variable during each year of the seven-year period less the average value for the entire tranquil period.

¹³⁰Standard error bands were calculated using both standard errors for crisis window and tranquil-period means.

¹³¹The real effective exchange rate was detrended by its country mean.

¹³²In logarithms.

¹³³Measured in terms of reference country currency (U.S. dollar or deutsche mark).

¹²⁹This has been found, among others, by Gavin and Hausmann, "The Roots of Banking Crises."

¹³⁰For further evidence, see Graciela Kaminsky and Carmen Reinhart, "Banking and Balance-of-Payments Crises: Models and Evidence" (unpublished; Washington: Board of Governors of the Federal Reserve System, 1996).

¹³¹Demirgüç-Kunt and Enrica Detragiache, "The Determinants of Banking Crises," provide evidence on the role played by the terms of trade in precipitating a banking crisis.

prices, or a rise in global interest rates weakens an overextended banking system.¹³²

Deficiencies in the institutional and regulatory framework of the financial sector are often an important feature of banking system crises. The lack of consistent data on such arrangements, however, makes it difficult to analyze the connections between them and the ability of the financial sector to survive adverse conditions. Nonetheless, fragmentary evidence suggests that in many of the countries that have experienced banking crises, the system was either subject to excessive government influence or had been liberalized before adequate prudential regulations and supervisory arrangements had been put in place. For instance, before the crisis at the beginning of the 1990s in Sri Lanka, state-owned banks accounting for almost 70 percent of the banking system are estimated to have had nonperforming loans amounting to about 35 percent of their total loan portfolio. In Costa Rica, prior to the crisis of the mid-1980s, public banks accounting for 90 percent of total credit considered about 30 percent of their loans to be uncollectible.¹³³ By contrast, the Colombian banking crisis of the mid-1980s, the Venezuelan crisis of 1994–95, the crisis in Spain during the early 1980s, as well as the Thai crisis of 1983–87 and the Malaysian crisis of 1985–88, can be largely attributed to the liberalization of the financial system without adequate prior strengthening of the regulatory and accounting framework and bank supervision.¹³⁴

Early Warning Signals of Vulnerability to Currency Crises

The differences identified above in the average behavior of a number of macroeconomic variables between periods leading up to a currency crisis and tranquil periods are suggestive, but they could not be used with any confidence as an early warning system of crises, for a number of reasons. First, the statistical significance of the differences identified has not been established. Second, an early warning system should indicate vulnerability to crises well in advance and a number of the variables mentioned above tend not to signal vulnerability until a crisis is about to occur.

¹³²Eichengreen and Rose, “Staying Afloat When the Wind Shifts,” found that, after taking into account domestic macroeconomic factors, higher interest rates in the advanced economies are strongly associated with the onset of banking crises in emerging market countries.

¹³³However, the inherent problem with using nonperforming loans as a leading indicator of crisis is that many loans do not turn bad until after the crisis has erupted. Alternative indicators of the strength of the system are the capital adequacy ratio and the extent of loan provisioning. Risk-weighted capital adequacy ratios, however, are often not comparable across countries.

¹³⁴For further details on these crises, see Caprio and Klingebiel, “Bank Insolvencies: Cross-Country Experience.”

Moreover, in many cases information about the behavior of the economic variables examined is available only with a delay too long to make them useful as leading indicators.

When these requirements are taken into account, only a handful of variables may be considered to consistently provide information about vulnerability to a currency crisis—in the sense that they correctly signaled crises a significant number of times and did not sound frequent false alarms, and also provided signals early enough for countermeasures to be taken. These variables were the real exchange rate, credit growth, and the M2-to-reserves ratio. Together they can provide some useful information about the risks of a possible crisis. Specifically, if these variables have been consistently above their average levels during normal times, then a country would seem potentially vulnerable to a crisis in the event of, say, a rise in world interest rates or some other disturbance that adversely affects investor confidence (Table 16). These results are preliminary and should be viewed simply as illustrative of an early warning system of vulnerability.

The overvaluation of the real exchange rate was one of the earliest and most persistent signals of vulnerability. As early as 13 months before a crisis, real appreciation of the domestic currency relative to its previous two-year average tended to signal a currency crisis. Moreover, this signal persisted throughout the buildup to the crisis. Other variables that displayed these properties were the M2-to-reserves ratio and the growth of domestic credit.¹³⁵ Equity price declines significantly signaled currency crises only for industrial countries. Low real interest rates, reflecting easy monetary conditions, also were a useful indicator variable. Terms of trade deteriorations at around eight months prior to the crisis provided a strong signal for the emerging market countries. The world interest rate was not a significant indicator, except very close to a crisis. These conclusions are, of course, contingent on the methodology used (described in Table 16) in this chapter.

In cases where a crisis in one country spills over or spreads contagiously to other countries—owing, say, to trade or financial linkages—these variables may not provide the best indicators for the nonoriginating countries.¹³⁶ In these cases, a crisis in a closely linked economy, or in an economy perceived to have similar characteristics, may be the most informative signal. Nevertheless, the above variables can serve as indicators of vulnerability to spillovers. In the recent Asian currency crisis, although some contagion effects were evidently at play in spreading the crisis, the affected

¹³⁵Kaminsky, Lizondo, and Reinhart, “Leading Indicators of Currency Crises,” report similar results.

¹³⁶See Eichengreen, Rose, and Wyplosz, “Contagious Currency Crises,” for evidence supporting trade linkages as a transmission mechanism for contagion effects.

Table 16. Significance of Early Warning Indicators of Vulnerability to Currency Crises¹

Indicator	Country Group	Months Prior to a Crisis		
		13	8	3
Real exchange rate appreciation	Industrial	•	•	•
	Emerging market	•	•	•
Domestic credit expansion	Industrial		•	•
	Emerging market		•	•
M2-to-reserves expansion	Industrial	•	•	•
	Emerging market	•	•	•
Stock price decline	Industrial	•	•	•
	Emerging market			
Low domestic real interest rates	Industrial	•	•	
	Emerging market			
Terms of trade deterioration	Industrial			
	Emerging market		•	
World real interest rate increase	Industrial			•
	Emerging market			•

¹The table shows the results of a series of probit regressions of the binary crisis indicator on the previous 6-month lagged average of each variable at 3, 8, and 13 months before the crisis date. Each regression included a dummy for the industrial countries and an interaction term of the dummy with the variable. A variable was deemed to be a significant indicator at the indicated lag if the appropriate estimated coefficients were significant at least at the 10 percent level. A bullet denotes that the variable is significant at the indicated lag. The regressions were based on monthly data from January 1975 to November 1997 for a sample of 50 countries, which included 20 industrial countries.

economies, by and large, also displayed signs of macroeconomic vulnerability.

The appreciation of the real exchange rate, the growth of real domestic credit, and the growth of un-backed domestic banking sector liabilities (the ratio of M2 to international reserves)¹³⁷ were used to form an index of macroeconomic vulnerability to a currency crisis, which was calculated for six Asian and four Latin American countries (Figure 28).¹³⁸ Note that the index is intended to be used to identify vulnerabilities that give rise to a substantial risk of crises, not to predict crises. Policy actions or a change in economic conditions may dissipate the risk of a crisis. Also note that crises may occur even when there are no apparent vulnerabilities, owing to pure contagion effects.

The index shows that, beginning in early 1997, vulnerability increased in almost all of the east Asian economies most affected by the recent turmoil. Thailand, Malaysia, and to a lesser extent Indonesia and Korea all were vulnerable according to the index. A sustained buildup in macroeconomic imbalances is often followed by a sudden jump in the index of foreign exchange market pressure that was used to identify the eruption of a currency crisis. This is most evident in the cases of Thailand and Malaysia. Such a

buildup was also present in the 1994–95 Mexican crisis. In the major emerging market countries that have successfully resisted contagion and spillover effects from the east Asian crisis, there were no such signs of vulnerability in mid-1997. For instance, Argentina, Brazil, Chile, Mexico, and Singapore showed little sign of vulnerability. The rather short lead-up to the crisis in Thailand shown by the index, and the absence of vulnerability in some of the non-Asian emerging market economies that experienced contagion effects, suggests that other indicators, such as current account imbalances (which were not included in the index), also need to be monitored.

No single index is likely to capture the complexity of developments leading up to a crisis, which usually includes significant elements of vulnerability coupled with economic disturbances, political events, or changes in investor sentiment associated with contagion effects. Indicators of vulnerability need to be supplemented with country-specific information in order to arrive at a judgment concerning a country's true vulnerability to a currency crisis. Furthermore, although the index performed reasonably well for emerging market countries, it did not do so for many industrial countries, reflecting perhaps the importance of other factors such as labor market conditions. As noted earlier, the usefulness of the index as an early warning system depends also on the availability of timely information. If the relevant information is not available on a timely basis, the index simply serves to

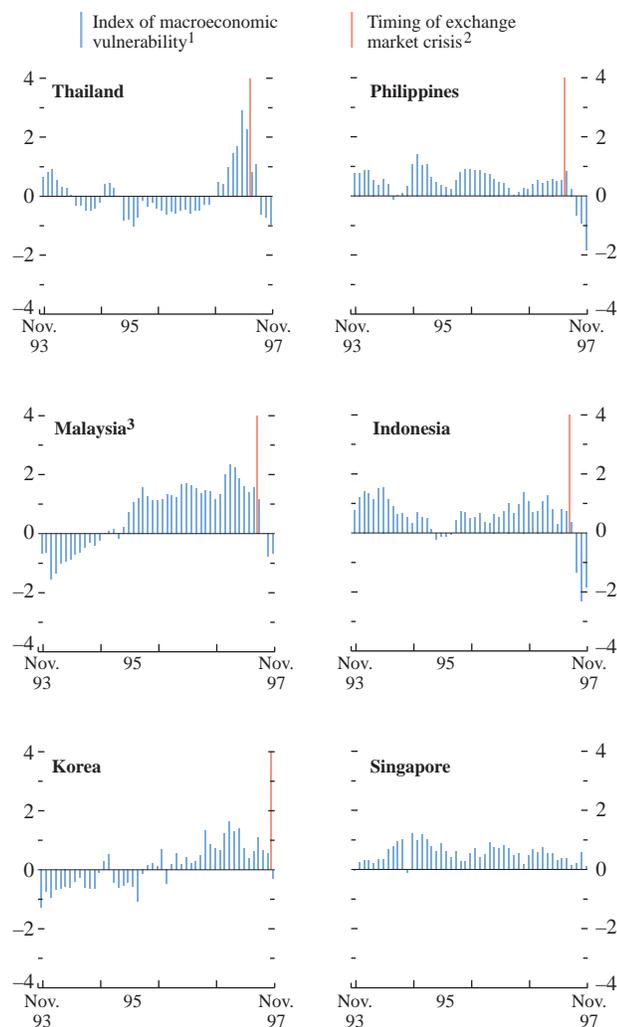
¹³⁷Sachs, Tornell, and Velasco, "Financial Crises in Emerging Markets," used these variables to study the contagion effects of the 1995 Mexican crisis.

¹³⁸The index of macroeconomic vulnerability is defined in Figure 28.

Figure 28. Asian Currency Crisis: Indicators of Vulnerability

(In standard deviations)

In early 1997, several of the east Asian economies showed signs of vulnerability.



* * *

summarize certain elements of vulnerability after the event—and is useful only as an analytical tool to study historical crises.

The index of vulnerability to currency crises presented in this section is only one example of such indicators emerging from the developing research in this area. Other indices may yield somewhat different conclusions, and all will have their limitations. IMF staff, of course, recognizing the complexity of the causes of financial crises, do not rely on any single indicator. Rather, they base their assessments of countries' macroeconomic conditions and vulnerability to financial disturbances on comprehensive analysis of the available information, in consultation with the authorities of IMF member countries.

The recent east Asian crisis and the “tequila crisis” of 1994–95 are the latest of a large number of financial crises witnessed in the past two decades. These crises have been very costly for the countries most directly affected: the countries where the crises originated and the countries that, although perhaps vulnerable to crisis, might have escaped had it not been for spillover and contagion effects. In view of these costs, a key concern of policymakers and financial markets is to identify the causes of crises and to prevent them.

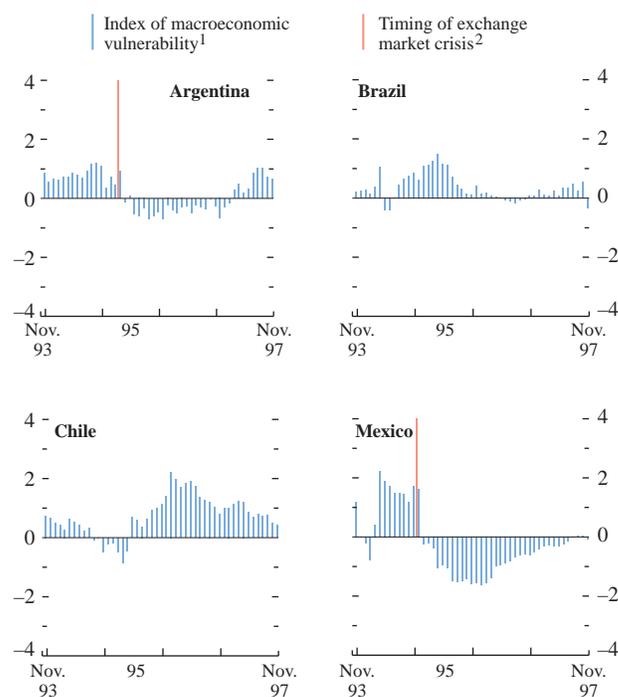
It is of course impossible to predict crises reliably, and any successful attempts to construct models to do so would presumably affect the behavior of policymakers and financial market participants alike, which would quickly render the models obsolete. Furthermore, for crises arising from pure contagion effects, early warning signals may be unavailable because the crises stem from inherently unpredictable market reactions. What is more feasible is to identify the kinds of weaknesses that typically render economies vulnerable to financial crises, including to spillover effects, whether or not a crisis does materialize. This chapter has examined the behavior of a number of macroeconomic variables around the time of currency and banking crises over the past two decades, with a view to identifying such indicators of vulnerability.

The analysis suggests that, typically, in the lead-up to a currency or banking crisis, the economy is overheated: inflation is relatively high, the real exchange rate is appreciated, the current account deficit has widened, domestic credit has been growing at a rapid pace, and asset prices have often been inflated. Reflecting this average pattern, real exchange rate appreciation, excessive domestic credit expansion, and a rapidly rising ratio of broad money to international reserves were found to provide signals of vulnerability to pressures in currency markets. Other variables, especially equity price declines and deteriorations in the terms of trade, also provided early signals, but with

less regularity, and a rise in world interest rates was a strong signal close to the time of a crisis.

As an illustrative initial application of the developing research in this area, a combination of the three most significant of these variables indicated the emergence of vulnerabilities in most of the east Asian countries affected by the recent crisis and in the earlier Mexican crisis. However, such indicators of vulnerability can easily give false signals, and they cannot predict crises. It should also be emphasized that the indicators examined in this chapter are best suited for analyzing crises related to the buildup of overheating pressures and may not be suitable for analyzing other kinds of crises—for instance, those associated with divergences in policy requirements owing to growing differences in business cycle and labor market conditions among countries in a fixed exchange rate arrangement, or crises stemming from spillover or contagion effects. Nevertheless, insofar as the risks of spillover and contagion effects are likely to be most acute in countries that exhibit macroeconomic imbalances, indicators of the type described above may still be useful. They may serve to complement other indicators of vulnerability that have received particular attention as the Asian crisis unfolded, including indicators of nonperforming loans in the banking system or of short-term currency exposure in both the financial system and the corporate sector.

Figure 28 (concluded)



¹The vulnerability index is calculated as the weighted average of the deviations of the real exchange rate, the 12-month percent change in real domestic credit, and the ratio of M2 to foreign reserves from their respective three-year means. Weights are the inverse of the three-year, country-specific standard deviation.

²Based on the index of exchange market pressure as described in the text.

³Because of unavailability of data, for Malaysia the index in the period after November 1996 does not include growth in real domestic credit.