



The Challenge of Predicting Economic Crises

As financial systems around the globe become increasingly integrated, policymakers have less time to respond to swiftly moving developments. Is it possible to develop early warning signals to help them anticipate incipient problems in currency markets and banking systems?

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GIVEN the global integration of financial markets over the last decade, large capital flow reversals can occur quite quickly, considerably shortening the time policymakers have to respond. As a consequence, and motivated in part by the recent crises in Europe (1992), Mexico (1994–95), and Asia (1997–98), researchers are taking a fresh look at the determinants of currency and banking crises and are attempting to develop early warning systems to signal when trouble may be brewing in currency markets and banking systems. The lack of transparency in the operation of financial systems, especially in emerging markets, considerably complicates this task.

Identifying crises

As a first step, researchers must characterize situations that can be termed full-fledged

currency or banking crises, or both. Defining currency crises as instances when a large currency depreciation takes place excludes episodes when a currency is under substantial pressure but a country's authorities manage a successful defense by, among other measures, raising interest rates or intervening in the foreign exchange market or both. Thus, to define currency crises, most researchers use indices—and these may vary from one researcher to another—that weigh changes in the exchange rate, foreign exchange reserves, and, if available, short-term interest rates. However, the resulting definition may not capture all crisis situations because, as has occurred in several instances, a country may respond to exchange market pressures by introducing capital controls.

Stresses in the banking system are difficult to quantify—more so even than those in

currency markets. Banking sector weaknesses generally emerge because the quality of assets deteriorates. Data on nonperforming assets are not always reliable and timely, and even indirect evaluations of asset quality require information on bankruptcies, exposures of financial intermediaries to different sectors, and movements in real estate and other asset price information that is generally hard to come by in many developing and transition economies. Because the data necessary for making an assessment are generally not available, the dating of banking crises must rely on such events as bank closures and government support for, or takeover of, financial institutions.

Identifying leading indicators

After having characterized a number of episodes as crises, researchers have generally used two types of empirical methodologies in their effort to identify a group of variables—or “leading indicators”—that policymakers can use to forecast crises in currency markets and banking systems.

Many researchers have identified leading indicators by comparing the behavior of a variable before a crisis with its behavior during tranquil times. (See, for example, Frankel and Rose, 1996; and International Monetary Fund, 1998). A variable is a useful leading indicator if it displays anomalous behavior before a crisis but does not provide false signals of an impending crisis in normal or tranquil times. To determine anomalous behavior for a particular variable, researchers attempt to achieve some balance between decreasing the probability of not predicting crises and decreasing the probability of giving false signals of stress. The advantage of such “univariate” event analyses (that is, those in which each determinant of a crisis is examined individually) is that they are easy to implement and do not impose restrictive models on the data. However, when multiple indicators are available, one must consider combining them to predict the possibility of a crisis. Efforts to do this are still at a preliminary stage (see Kaminsky, 1998).

A second approach—using “limited-dependent variable” econometric models—has been to directly estimate the probability of a currency or banking crisis and to identify the variables that statistically aid in predicting crises (see Frankel and Rose, 1996). The advantage of this approach is that several indicators are evaluated simultaneously; the statistically significant ones can then be used to calculate the probability that a crisis will occur at a specific time. It should be noted, however, that this methodology has been used with annual data and further refinement of leading indicators would require a large number of observations on the “rare” events categorized as crises. Using only, say, quarterly or monthly data is not enough. Although such data may permit greater refinement of the dynamics leading up to crises, the estimation requires more information on a larger number of the key informative events—the crises. For currency and banking crises, such large data sets are typically not available.

Do leading indicators work?

What set of leading indicators of currency and banking crises is likely to prove most useful? Different methodologies, time periods, and sample countries, as well as the diverse definitions of what constitutes exchange market pressure and banking system distress, make it difficult to compare results across the various studies and arrive at a clear-cut answer. That said, some very tentative conclusions about indicators of vulnerability can be drawn from recent studies (see, for example, Kaminsky, Lizondo, and Reinhart, 1998).

An overvaluation of the real exchange rate, rapid domestic credit growth, an expansion of credit to the public sector, a rise in the ratio of broad money to foreign exchange reserves, an increase in the domestic inflation rate, a decline of foreign direct investment flows, and an increase in industrial country interest rates may provide warnings of a currency crisis. Other factors that receive some, though less, empirical support as leading indicators of currency crises are a widening of the trade deficit, an increase in the fiscal deficit, a deterioration in export performance, and a slowdown in real GDP growth. Current account and fiscal deficits, however, do not seem to garner a lot of support as important indicators. (See Milesi-Ferretti and Razin (1998) for further discussion of current account deficits as predictors of currency crises.)

Banking crises are often preceded by large inflows of short-term capital, a rapid expansion of domestic credit—frequently a consequence of financial liberalization coupled with inadequate supervision by bank managements as well as regulators—a slackening of real activity, and declines in the stock market and the prices of other assets. Case studies suggest that, in many instances, liberalization without adequate strengthening of the regulatory regime not only sets the stage for a banking crisis but also makes it more difficult to cope with a crisis if one erupts.

How well do current models (estimated using historical data) predict crises outside the sample? Recent events raise the question of whether these models, using data through the end of 1996, would have alerted policymakers to the possibility of the kind of turmoil that has been witnessed in Asia. Berg and Patillo (1998) and International Monetary Fund (1998) attempt to answer this question by comparing the performance of different approaches in predicting the Asian currency crises of 1997–98. They conclude that, while the forecasts are informative, the models do not as yet provide much improvement over informed guesses. Demirgüç-Kunt and Detragiache (1999), using publicly available aggregate data to predict banking crises, also meet with limited success. In this context, two points should be noted. First, leading-indicator models are still in their infancy, and the more rigorous data-reporting requirements for financial and nonfinancial institutions that are just beginning to be introduced may enhance the usefulness of such models. Second, the entire sovereign and bank-credit-rating industries did not foresee the vulnerable situation of many Asian economies and

were surprised by the timing and depth of the crisis; it is unlikely that simple models will be up to the task of crisis forecasting in the near future.

Difficulty of predicting crises

The timing of events in the economic arena is notoriously difficult to analyze. Economic theory, while relatively good at characterizing equilibrium situations, tends to be less informative about the dynamics that could lead from one equilibrium to another. To predict the timing of such infrequent events as financial crises, which may depend critically on variables that are hard to capture—for example, the structural features of a country's economy, institutional developments, changes in the country's political landscape, and expectations of domestic and foreign players in various markets—is likely to be even more challenging. More important, the process of policymaking and the policy responses themselves have a crucial bearing on whether situations of stress degenerate into crises. And, typically, these phenomena cannot be taken into account in economic modeling exercises. Hence, it is not surprising that models that do not incorporate policy responses within them have not met with much success.

The paucity of data on crisis episodes significantly hampers researchers' efforts to further refine current models that examine such events and whose purpose is to identify leading indicators. For example, researchers are forced to assume that the parameters of their models characterizing the behavior of certain variables as a crisis builds up and unfolds are similar across time and countries. Given the diversity of countries' institutional arrangements, the dramatic changes that have taken place in the financial systems of industrial and developing countries in the last decade, and the increased integration of global markets, such assumptions may well be untenable. The acceptable levels of certain variables are likely to differ across countries and could well change over time for the same country. A lack of adequate data makes it difficult, if not impossible, to test such assumptions.

Conclusion

In the end, the holy grail of crisis prediction may be intrinsically unattainable. Indeed, the very success of such models in predicting crises would eliminate the phenomenon they were trying to predict if policymakers took appropriate action in response to early warning signals. Furthermore, given that foreknowledge of crises would typically allow trading profits to be made, a successful prediction model is unlikely to exist in efficient markets.

Crises that erupt because weak fundamentals make a country vulnerable to adverse shocks may be predictable. Economic models are less likely to be able to anticipate crises that arise because of either a unique chain of events or pure



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contagion effects; because technology, new instruments, and new ways of doing business transform the financial system in unforeseen ways; or because some widely held belief proves to be false. The Latin American debt crisis of the 1980s shattered the prevailing myth that sovereign states could not default. The 1992 crisis of the European exchange rate mechanism showed that countries, even industrial ones, with high unemployment may prefer to exit a fixed exchange rate system rather than to live with the consequences of higher interest rates for a short time. The 1994 Mexican crisis taught us about vulnerabilities associated with short-term sovereign foreign currency debt and a weak banking system. The Asian financial crisis, though inextricably linked to domestic

macroeconomic and financial developments, has put the spotlight on the structural features of financial systems more broadly and revealed that the debt exposures and currency imbalances of private corporations and financial institutions can be as lethal as those of the public sector. Hence, what is needed is not only a better understanding of the run-ups to crises past, but also a better grasp of what events could precipitate crises in the fast-paced, evolving international financial environment. **F&D**

This article is based on a study that was published as Annex III of International Monetary Fund, 1998, International Capital Markets: Developments, Prospects, and Key Policy Issues (Washington).

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