

Beyond comparative statics

David Rowe says it is time to extend stress testing to include more than just analysing the immediate impact of selected extreme events

It is sometimes said that when your only tool is a hammer every problem looks like a nail. That is a rather picturesque way of saying that, to a greater or lesser extent, we all tend to be prisoners of our personal training and experience. In the past 15 to 20 years, financial risk managers have built elaborate and complex simulation systems to evaluate the impact of short-term movements in market variables. Driven first by the desire for some consistent means of comparing as well as aggregating the risk implied by a firm's trading positions, these efforts led to widespread calculation of what we now know as value-at-risk.

Despite the complaints of its critics, practitioners knew from the beginning that VAR did not address the potential losses in the extreme tails of the distribution. The best-managed firms were quick to develop some form of periodic stress testing to supplement daily VAR estimates. Most often these took the form of extreme shocks to market rates and prices. The magnitude of these shocks was usually calibrated to approximate, although sometimes to exceed, the largest moves observed historically. Rerunning 'the market's greatest hits' has been a common basis for such simulations.

More recently I have argued that it is important to look inward first, to determine types of market events that would have the most severe impact on a firm's net worth and then stress [TEST?] those variables accordingly (*Risk* March 2007, page 71). Some have dubbed this approach 'reverse stress testing'.

One problem with these approaches is that they represent exercises in comparative statics. One or more shocks of unusual magnitude are applied to the current financial position to determine the losses that would result. For better or worse, real-world crises simply don't develop that way. Certainly the current global financial crisis did not do so. Real crises unfold dynamically over time and exhibit a series of loosely causal events where shocks exploit other weaknesses that might have remained latent and benign in the absence of the preceding shocks.

One contemporary example of this is that

banks blithely chose to hold uncontrolled amounts of the AAA rated senior tranches of subprime mortgage portfolios. These securities were blindly viewed as highly rated and very liquid substitutes for secure money-market instruments. The eventual realisation that housing prices could fall dramatically meant that liquidity evaporated. In the absence of active markets for them, the value of these securities became highly uncertain. This inevitably would have resulted in huge losses for those holding them. Those losses need not, however, have triggered a global systemic crisis. What caused this was the fact that such a huge proportion of these securities were held by the core banking system. The sudden uncertainty around the fair value of these securities raised serious doubts about the capital adequacy of the banks themselves. This resulted in an unwillingness of banks to lend to each other at even very short maturities. No-one wanted to place significant idle cash with a bank that subsequently announced huge write-offs that seriously undermined its capital base. The money market froze, businesses found it hard to roll over even fully secured short-term financing, and the crisis quickly spread from the financial sector to the rest of the economy.

A third approach to stress testing is what I have called "imagination" (*Risk* March 2007, page 71). Most often this is a periodic (usually annual or semiannual) exercise that takes many weeks to prepare. Even here, however, the process often amounts to an exercise in comparative statics. Multiple calibrated shocks derived from geopolitical considerations are applied to current or potentially permitted positions to determine the resulting losses.

All the exercises described here have an important place in analysing an institution's vulnerability to extreme losses in a period of stress. Nevertheless, they don't deal with the type of loosely connected dynamic sequence of related and reinforcing events that characterise actual historical crises. It is essential to supplement comparative static stress tests with consideration of threats posed by potential sequences of loosely causal events over time. It is unrealistic to think this more expansive perspective on systemic risk can lead to the type of detailed potential loss estimates we have come to expect from risk analysis. Nevertheless, this perspective should inform a continuing senior management discussion. The very process of thinking through the dynamics of a potential crisis can make decision-makers more alert to such a sequence of events if it starts to unfold, and better positioned to react in a timely manner. ■

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