

Foundations of sand

Despite the remarkable advances made over the past 25 years, David Rowe argues the industry's existing risk models are not fit for purpose when it comes to stress testing and analysis of tail risk

"He was like a foolish man who built his house upon the sand; and the rain fell, and the floods came, the winds blew and beat against that house... and great was the fall thereof" (Matthew 7:26–27).

This year marks the fiftieth anniversary of the publication of Thomas Kuhn's highly influential book *The Structure of Scientific Revolutions*. It argued that the popular view of science – developing through a slow, steady accumulation of small advances – only tells part of the story. Less frequent but fundamentally more important, in Kuhn's view, are periodic upheavals in the entire framework and mental outlook of a particular field. He dubbed these revolutions 'paradigm shifts', inadvertently coining an expression that has since become much overused. Nevertheless, I believe a paradigm shift is exactly what the financial risk management profession requires at the moment.

For more than 25 years, we have been building distributional models to estimate the volatility and covariability of market rates and prices. Theoretically, such techniques require the underlying assumption of classical statistics – that the processes being observed exhibit stable, random distributions. Everyone knew this was not strictly true but a core article of faith was that changes in the underlying stochastic structure were sufficiently gradual and incremental that distributional methods worked well enough.

The seductively deceptive reality is that this gradualist assumption holds pretty well for much of the time. As we have seen in the past four years, however, periods when this assumption fails are among the most dangerous of all – and being mentally captive to an inappropriate paradigm can magnify the peril by leaving management with information that is too limited and insufficiently timely to respond to a crisis.

To be fair, the so-called black swan event has now become as much a part of our intellectual framework as the paradigm shift. The worry, however, is that risk management is only paying lip-service to the importance of tail risk. Examples of this failure include the following:

- Continuing to relegate stress testing to periodic fire drills rather than making it a part of day-to-day risk assessments.
- Relying exclusively on technical quantitative techniques without making the cultural adjustments needed to incorporate softer and more qualitative information and experienced judgement.
- Finally, failure to recognise that analysis of tail risk demands quantitative models that are fundamentally different from those we have developed since the mid-1980s.

With respect to the last bullet point, the problem is that stress analysis requires models that focus on capturing structural characteristics of the underlying processes in question. The harsh reality is that the distributional models we have developed over the past 25 years are fundamentally not fit for purpose when applied to the challenge of stress testing.

How, for example, would the impact of an economic downturn affect a credit portfolio differently if it is triggered by an oil embargo and skyrocketing energy prices than if it is triggered by a financial crisis in the eurozone and falling energy prices? Just increasing volatilities and fiddling with correlations cannot address this question. A detailed translation of macro assumptions into micro implications is required. This demands empirically grounded structural relationships that are totally lacking in our standard risk quantification models.

Even more suitable models will fail, however, if they are used in a blind, mechanical way without judgemental inputs and geopolitical analysis of what makes any given situation unique. Unfortunately this advice is not easily implemented by the large proportion of risk managers who have a narrowly technical background. Effective sourcing and use of judgemental inputs is the work of a lifetime – it is not a short-term fix.

One implication of all this is that we need a significant shift in risk management personnel away from highly skilled specialists in the current techniques and towards professionals with a broader and richer background in the social sciences.

A second implication is that if risk management continues to rely on existing risk models for an assessment of tail risk, the industry will discover that it has built its house on sand. Amid the rain, floods and wind of the next crisis, great will be the fall thereof. ■

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